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Oil and Gas Well Blowout Report

Events of 1987

September 1988

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1 SUMMARY

This is the fourth edition of this report. It contains specific information about wells licensed and drilled, drilling rig inspections, and drilling occurrences. A summary for each blow/blowout that occurred in 1987 as well as a 10-year historical blowout summary is provided. The Board considers the publication of this information to be a constructive way to improve the level of understanding of many aspects of well control and drilling occurrences, and the ERCB role in this matter.

1987 Summary

In 1987, some 5000 wells were drilled by 514 active drilling rigs. Only 2 blowouts occurred while drilling the approximately 5000 wells. There were 17 blowouts among approximately 81 000 active wells. During the year the ERCB made 1877 inspections of drilling rigs, including 161 inspections of 45 critical sour wells*. Details and comments respecting these operations are provided in the respective sections of this report.

The Board has carefully reviewed the events and incidents of 1987 and concludes that actual performance in 1987 was comparable to previous years. It is apparent that there is a growing inventory of active wells, and the fact that the leading cause of blowouts is equipment failure indicates the need for regular maintenance programs for all active wells.

In an effort to further improve the performance of the Oil and Gas industry, the Drilling and Completions Committee (DACC) came into being in 1987. DACC evolved as a means to continue the industry/regulatory co-operation which had developed during the work of the Blowout Prevention Review Committee (BPRC). Whereas the BPRC was established as a result of the Lodgepole Blowout Inquiry to make recommendations regarding the drilling, completion, and servicing of critical sour wells only, DACC will address various issues for all types of wells.

One of the areas DACC is currently focusing on is forming a technical subcommittee to develop a set of guidelines and procedures for suspending and/or abandoning cased wells. As well, DACC will continue to concentrate on worker safety and training.

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* For a complete definition of a critical sour well, please refer to the Appendix.

2 WELLS LICENSED AND DRILLED

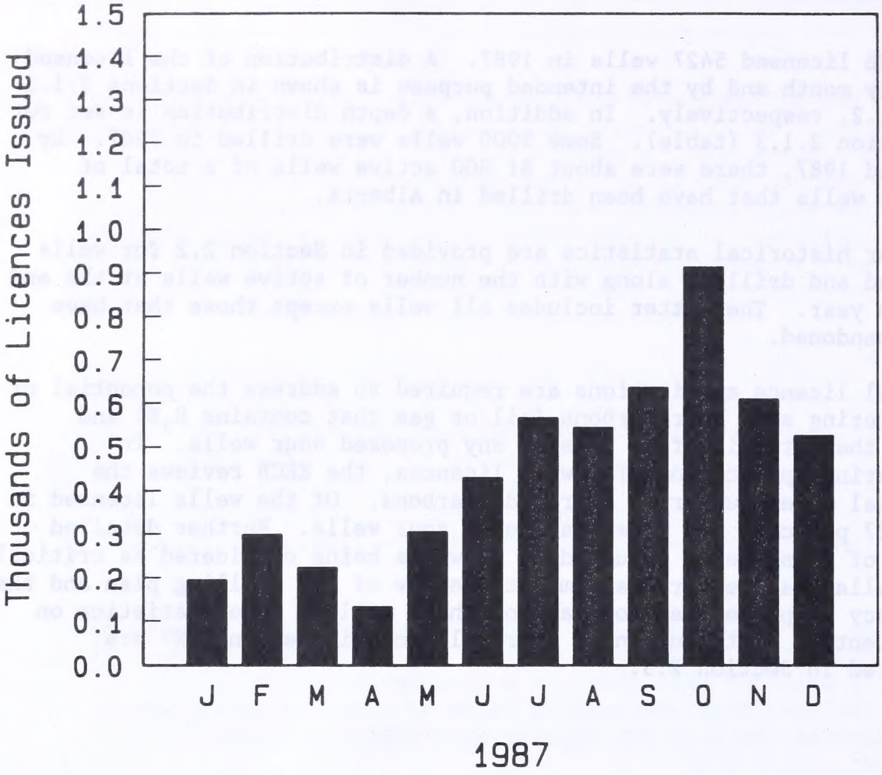
The ERCB licensed 5427 wells in 1987. A distribution of the licensed wells by month and by the intended purpose is shown in Sections 2.1.1 and 2.1.2, respectively. In addition, a depth distribution is set out in Section 2.1.3 (table). Some 5000 wells were drilled in 1987. By year-end 1987, there were about 81 000 active wells of a total of 119 000 wells that have been drilled in Alberta.

Ten-year historical statistics are provided in Section 2.2 for wells licensed and drilled, along with the number of active wells at the end of each year. The latter includes all wells except those that have been abandoned.

All well licence applications are required to address the potential of encountering sour hydrocarbons (oil or gas that contains H_2S) and assess the potential flow rate of any proposed sour wells. In considering applications for well licences, the ERCB reviews the potential of encountering sour hydrocarbons. Of the wells licensed in 1987, 27 per cent had potential to be sour wells. Further detailed review of these wells resulted in 47 wells being considered as critical sour wells that required a complete review of the drilling plan and the emergency response plan for each of those wells. Some statistics on the potential distribution of sour wells considered in 1987 are presented in Section 2.3.

2.1 Wells Licensed - 1987

2.1.1 Wells Licensed by Month



2.1.2 Purpose of Wells Licensed

Intended Purpose	Wells
Oil and Gas Conventional	5 122
Oil Sands	140
Experimental*	148
Others#	17
Total	5 427

---

* Primarily for oil sands operations.

# Test holes, farm gas wells, industrial water wells, and domestic water wells.

2.1.3 Wells Licensed by Depth/Month

Month	Depth (m) 0-750	751-1800	1801-3600	3601-6000	6001+
Jan	86	91	21	1	0
Feb	79	176	44	4	0
Mar	48	135	45	0	0
Apr	25	79	31	2	0
May	60	192	53	4	0
June	78	256	97	2	0
July	156	292	121	1	0
Aug	100	360	83	5	0
Sept	137	385	115	3	0
Oct	121	596	191	9	0
Nov	276	271	63	3	0
Dec	168	261	97	4	0
Total	1 334	3 094	961	38	0

2.2 Wells Licensed and Drilled - 1987 to 1978

	Licensed*	Drilled* Conventional Oil & Gas	Oil Sands (Estimates)	Active* Wells
1987	5 427	4 957	148	81 000
1986	4 620	4 245	200	79 000
1985	8 763	6 600	1 800	76 000
1984	7 178	5 660	950	70 000
1983	4 935	4 367	280	66 000
1982	5 807	5 122	310	62 000
1981	6 265	5 834	260	59 000
1980	7 820	7 048	340	53 000
1979	6 391	5 780	N/A#	47 000
1978	5 989	5 573	N/A#	42 000

---

* The difference between wells licensed and wells drilled can be attributed to well licence cancellations (up to 5 per cent in some years); oil sands well counts are estimated, and not all wells are drilled in the same calendar year as they are licensed. Also note that the addition of drilled wells to the active wells will not equate because of abandoned wells.

# Reliable estimates not available.

2.3 Sour Well Licensing Activity - 1987

Potential Sweet Wells	3 927
Potential Sour Wells	1 500
Total Wells Licensed	5 427
Critical Sour Wells	47

3 DRILLING RIG INSPECTIONS

This section provides statistics on the ERCB's drilling rig inspection activities for the years 1982 to 1987. Rig inspections are a primary function of the area offices. The intent of an inspection is to ensure that the rig is suitably equipped and personnel properly trained and certified to maintain control of the well regardless of the operation in progress.

The ERCB does not provide staff for inspection of every well that is drilled. A selection criteria is used where emphasis is placed on rigs with poor performance histories, rigs drilling sour wells, start of winter operations, and environmentally sensitive locations. Therefore, the results of the approximately one-third coverage must not be extrapolated to all the wells and cannot be interpreted as representative of overall drilling rig quality in the province. However, the results do indicate there has been a significant improvement in rig quality over the last several years. Drilling operations on many oil sands wells are not included in these statistics.

Since 1985, unsatisfactory rig inspection deficiencies have been classified as serious or significant. When a serious deficiency is identified the drilling operations are shut down until the deficiency is remedied. Definitions for "serious" and "significant" are detailed in the Appendix.

The Oil and Gas Conservation Regulations classifies wells according to drilling depth in defining blowout prevention requirements for drilling operations:

Class	Proposed Drilling Depth
I	Shallow well in which no surface casing is set
II	Less than 750 metres
III	Greater than 750 metres and less than 1800 metres
IV	Greater than 1800 metres and less than 3600 metres
V	Greater than 3600 metres and less than 6000 metres
VI	Greater than 6000 metres

Rig inspection coverage and results are presented by these well classifications in Section 3.1.4. Section 3.1.4 compares rig inspection results and unsatisfactory inspections since 1983, including serious deficiencies since 1985. The most frequently identified serious and significant deficiencies on the inspections are identified in Section 3.3. A copy of the rig inspection form used by ERCB inspectors is provided in Section 3.4.

The ERCB places a high emphasis on inspecting sour wells, particularly critical sour wells. In 1987, each critical sour well was inspected at least three times. The results of these inspections are presented in Section 3.2.

3.1 Drilling Rig Inspections

3.1.1 Summary for 1987

Wells spudded*	4 998
Active rigs	514
Inspections	1 877
Unsatisfactory inspections	170

---

* Spudded means commenced drilling.

3.1.2 Inspection Coverage and Results by Well Class - 1987

Well Class	Wells Spudded	Inspections	Total Unsatisfactory Inspections#	Serious Unsatisfactory Inspections#
I	545	33	4	3
II	624	108	8	3
III	2 886	965	96	51
IV	909	659	61	30
V	34	112	1	1
VI	0	0	0	0
Total	4 998	1 877	170	88

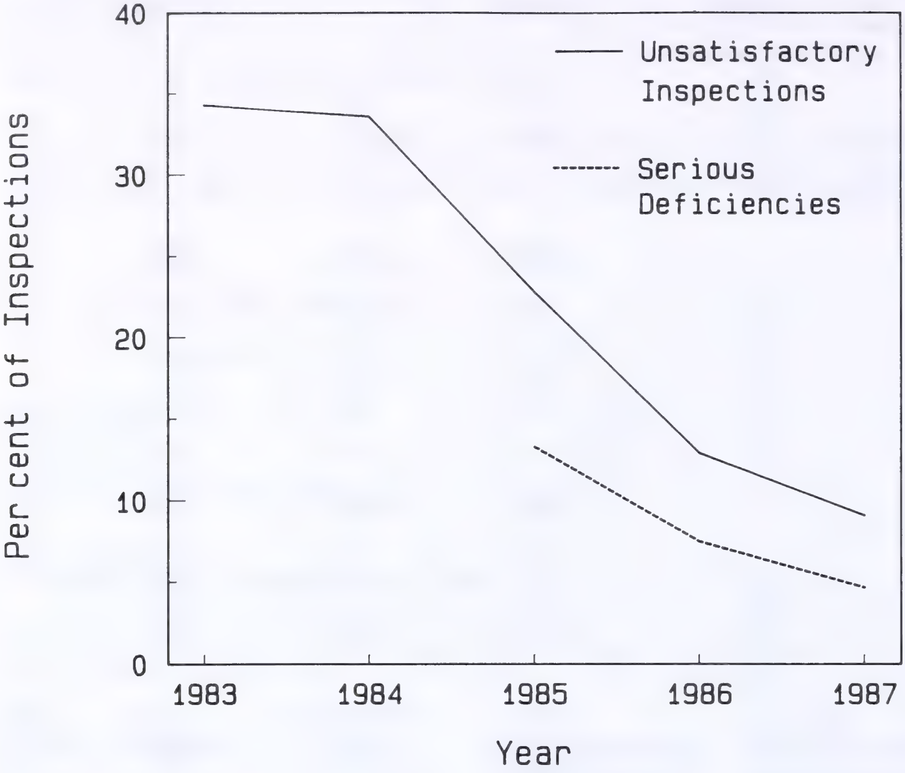
# The most frequent deficiencies are itemized in Sections 3.3.1 and 3.3.2.

3.1.3 Inspection Coverage and Results by Well Class - 1986 to 1982

Year	Well Class	Wells Spudded	Inspections	Unsatisfactory Inspections
1986	I	210	18	3
	II	948	174	35
	III	2 485	987	140
	IV	1 005	694	80
	V	41	108	0
	VI	0	0	0
		4 689	1 981	258
1985	I	798	32	13
	II	2 402	323	97
	III	3 360	1 144	281
	IV	1 425	879	163
	V	28	69	4
	VI	-	-	-
		8 013	2 447	558
1984	I	323	40	22
	II	1 698	190	73
	III	2 846	914	311
	IV	1 222	822	268
	V	16	49	4
	VI	-	-	-
		6 105	2 015	678
1983	I	83	16	7
	II	1 367	206	82
	III	2 178	744	259
	IV	961	649	220
	V	22	40	1
	VI	-	-	-
		4 611	1 655	569
1982	I	6	-	-
	II	2 134	269	137
	III	2 226	765	294
	IV	918	518	210
	V	22	34	6
	VI	-	-	-
		5 306	1 586	647

NOTE: Some minor changes to the statistics of previous years reflect updating to the ERCB database.

3.1.4 Unsatisfactory Drilling Rig Inspections - 1983 to 1987



The percentage of unsatisfactory ERCB inspections has declined steadily over the past 5 years from 34.4 per cent in 1983 to 9.1 per cent in 1987. This improvement is due to a major inspection and enforcement program initiated by the ERCB and industry in 1983.

3.2 Critical Sour Well Drilling Rig Inspections

3.2.1 Inspection Coverage and Results - 1987 to 1984

Year	Wells Licensed	Wells Spudded	Wells Drilling at Year-end	Inspections	Unsatisfactory Inspections
1987	47	45	2	161	2 (2 serious)
1986	42	34	12	130	2 (1 serious)
1985	31	29	7	88	2 (0 serious)
1984	14	13	3	45	5 (4 serious)

As is apparent from the previous table, the unsatifactory inspection percentage was less than 2 per cent during 1987, indicating a very high degree of rig quality and comparing favourably with the overall 9 per cent unsatisfactory figure for other inspections. Both of the serious deficiencies were detected prior to penetrating the critical zone. Operations were suspended immediately in each case by the ERCB while repairs were conducted.

3.3 Rig Inspection Deficiency Items - 1987 Inspections

3.3.1 Most Frequent Serious Deficiency Items

Item		Percentage of Total Serious Items	Number of Occurrences
1	BOPs or hydraulic valve failed to operate from remote position	11.8	15
2	Trip records not completed or being completed incorrectly	10.2	13
3	Accumulator precharge, or operating pressure, too low to operate annular preventer and hydraulic valve	10.2	13
4	BOPs or hydraulic valve failed to operate from driller's position	9.4	12
5	Remote drill pipe pressure not provided at manifold and/or remote drill pipe pressure gauge inaccurate	7.9	10
6	Mud-tank level monitoring device not operating during drilling or tripping	6.3	8
7	Accumulator pump failed to recharge accumulator	6.3	8
8	Well control data not provided (eg. maximum back pressure to be held on casing)	4.0	5
9	Crew training inadequate	4.0	5
10	Pressure gauge in manifold inaccurate (gauge or incremental range too low)	4.0	5
11	Flare line not connected to manifold, secured, or staked down	4.0	5
12	Fluid by-passing through BOP controls	3.0	4
13	Stabbing valve in closed position	2.4	3
14	Other	16.5	21
	Total	100	127

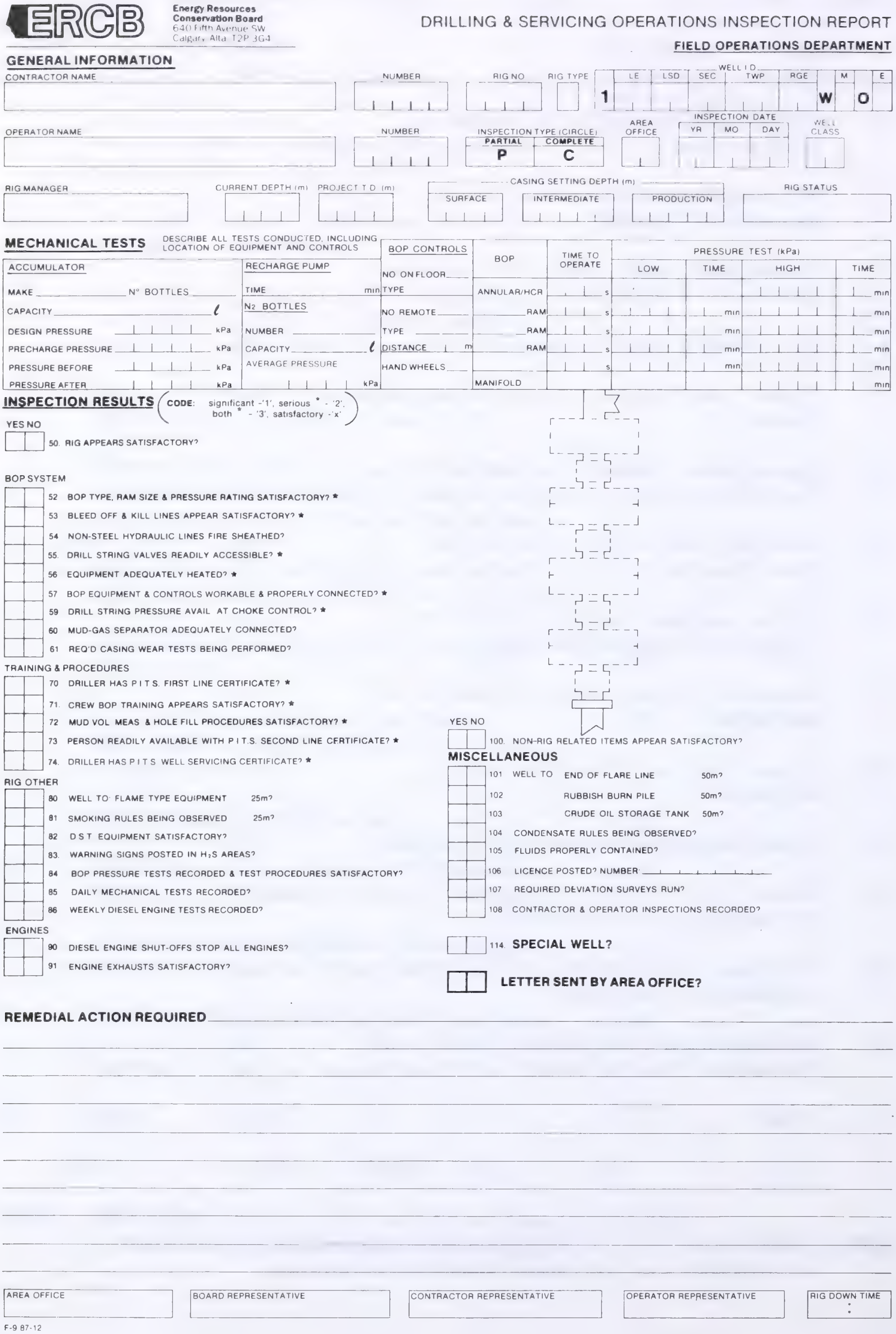
NOTE: ERCB Guide IG-11 - Rig Inspection Manual provides a complete list of serious deficiencies.

3.3.2 Most Frequent Significant Deficiency Items

Category	Description	Percentage of Total Significant Items	Number of Occurrences
1	Diesel engine shut-offs failed to stop engines	22.2	37
2	BOP handwheels not available or incorrectly sized	6.0	10
3	Accumulator pump failed to recharge system in 5 minutes	5.4	9
4	H_2S warning sign not posted	4.8	8
5	Flare line did not terminate in the flare pit	4.2	7
6	Incomplete pressure test data recorded in the tour reports	4.2	7
7	Crew BOP drills not recorded in tour reports	4.2	7
8	Valve handles missing on kill or bleed-off lines or manifold	3.0	5
9	Source of flame within 25 metres of wellbore	3.0	5
10	Flare line not 50 metres from wellbore	2.4	4
11	Clamp on valve handles not provided	2.4	4
12	Fluid turns in kill line not 90 degrees or not blocked	2.4	4
13	Fittings not available to determine accumulator precharge	2.4	4
14	Rubbish burn pile located less than 50 metres from wellbore	2.4	4
15	Other	31.0	53
	Total	100	168

NOTE: ERCB Guide IG-11 - Rig Inspection Manual provides a complete list of significant deficiencies.

3.4 RIG INSPECTION FORM



ERCB Energy Resources Conservation Board
640 Fifth Avenue SW
Calgary Alta T2P 3G4

DRILLING & SERVICING OPERATIONS INSPECTION REPORT

FIELD OPERATIONS DEPARTMENT

GENERAL INFORMATION

CONTRACTOR NAME	NUMBER	RIG NO	RIG TYPE	WELL I.D.: 1 LE LSD SEC TWP RGE W M O E
OPERATOR NAME	NUMBER	INSPECTION TYPE (CIRCLE): PARTIAL P COMPLETE C	AREA OFFICE	INSPECTION DATE: YR MO DAY; WELL CLASS
RIG MANAGER	CURRENT DEPTH (m)	PROJECT T.D. (m)	CASING SETTING DEPTH (m): SURFACE, INTERMEDIATE, PRODUCTION	RIG STATUS

MECHANICAL TESTS DESCRIBE ALL TESTS CONDUCTED, INCLUDING LOCATION OF EQUIPMENT AND CONTROLS

ACCUMULATOR	RECHARGE PUMP	BOP CONTROLS
MAKE ______ N° BOTTLES ______	TIME ______ min	NO. ON FLOOR ______
CAPACITY ______ ℓ	N₂ BOTTLES	TYPE
DESIGN PRESSURE ______ kPa	NUMBER ______	NO. REMOTE ______
PRECHARGE PRESSURE ______ kPa	CAPACITY ______ ℓ	TYPE ______
PRESSURE BEFORE ______ kPa	AVERAGE PRESSURE	DISTANCE ______ m
PRESSURE AFTER ______ kPa	______ kPa	HAND WHEELS ______

BOP	TIME TO OPERATE	PRESSURE TEST (kPa) LOW	TIME	HIGH	TIME
ANNULAR/HCR	s				min
______ RAM	s		min		min
______ RAM	s		min		min
______ RAM	s		min		min
	s		min		min
MANIFOLD					min

INSPECTION RESULTS (CODE: significant -'1', serious * - '2', both * - '3', satisfactory -'x')

YES NO

☐ ☐ 50. RIG APPEARS SATISFACTORY?

BOP SYSTEM

☐ ☐ 52 BOP TYPE, RAM SIZE & PRESSURE RATING SATISFACTORY? *
☐ ☐ 53 BLEED OFF & KILL LINES APPEAR SATISFACTORY? *
☐ ☐ 54 NON-STEEL HYDRAULIC LINES FIRE SHEATHED?
☐ ☐ 55. DRILL STRING VALVES READILY ACCESSIBLE? *
☐ ☐ 56 EQUIPMENT ADEQUATELY HEATED? *
☐ ☐ 57 BOP EQUIPMENT & CONTROLS WORKABLE & PROPERLY CONNECTED? *
☐ ☐ 59 DRILL STRING PRESSURE AVAIL. AT CHOKE CONTROL? *
☐ ☐ 60 MUD-GAS SEPARATOR ADEQUATELY CONNECTED?
☐ ☐ 61 REQ'D CASING WEAR TESTS BEING PERFORMED?

TRAINING & PROCEDURES

☐ ☐ 70 DRILLER HAS P.I.T.S. FIRST LINE CERTIFICATE? *
☐ ☐ 71. CREW BOP TRAINING APPEARS SATISFACTORY? *
☐ ☐ 72 MUD VOL. MEAS. & HOLE FILL PROCEDURES SATISFACTORY? *
☐ ☐ 73 PERSON READILY AVAILABLE WITH P.I.T.S. SECOND LINE CERTIFICATE? *
☐ ☐ 74. DRILLER HAS P.I.T.S. WELL SERVICING CERTIFICATE? *

RIG OTHER

☐ ☐ 80 WELL TO FLAME TYPE EQUIPMENT 25m?
☐ ☐ 81 SMOKING RULES BEING OBSERVED 25m?
☐ ☐ 82 D.S.T. EQUIPMENT SATISFACTORY?
☐ ☐ 83. WARNING SIGNS POSTED IN H₂S AREAS?
☐ ☐ 84 BOP PRESSURE TESTS RECORDED & TEST PROCEDURES SATISFACTORY?
☐ ☐ 85 DAILY MECHANICAL TESTS RECORDED?
☐ ☐ 86 WEEKLY DIESEL ENGINE TESTS RECORDED?

ENGINES

☐ ☐ 90 DIESEL ENGINE SHUT-OFFS STOP ALL ENGINES?
☐ ☐ 91 ENGINE EXHAUSTS SATISFACTORY?

YES NO

☐ ☐ 100. NON-RIG RELATED ITEMS APPEAR SATISFACTORY?

MISCELLANEOUS

☐ ☐ 101 WELL TO END OF FLARE LINE 50m?
☐ ☐ 102 RUBBISH BURN PILE 50m?
☐ ☐ 103 CRUDE OIL STORAGE TANK 50m?
☐ ☐ 104 CONDENSATE RULES BEING OBSERVED?
☐ ☐ 105 FLUIDS PROPERLY CONTAINED?
☐ ☐ 106 LICENCE POSTED? NUMBER ______
☐ ☐ 107 REQUIRED DEVIATION SURVEYS RUN?
☐ ☐ 108 CONTRACTOR & OPERATOR INSPECTIONS RECORDED?

☐ ☐ 114. **SPECIAL WELL?**

☐ ☐ **LETTER SENT BY AREA OFFICE?**

REMEDIAL ACTION REQUIRED ______

AREA OFFICE	BOARD REPRESENTATIVE	CONTRACTOR REPRESENTATIVE	OPERATOR REPRESENTATIVE	RIG DOWN TIME :

F-9 87-12

WHITE - CALGARY OFFICE PINK - AREA OFFICE YELLOW - RIG

4 DRILLING, SERVICING, AND OTHER OCCURRENCES

Drilling occurrences are abnormal or non-routine conditions or events that may be encountered while drilling or operating a well. They may be contributing factors affecting efficient operations or in controlling a well if hydrocarbons are present. When encountered, and depending on severity, conditions such as lost circulation and kicks may require special consideration to prevent occurrences such as blows or blowouts. Water flows encountered while drilling, usually at shallower depths, must be stopped before drilling deeper to avoid problems in maintaining hole integrity.

A summary of drilling occurrences encountered while drilling wells in 1987 involving lost circulation, kicks, blows, and blowouts for various depth categories are presented in Section 4.1.1. A historical summary of similar information, including water flows, is presented in Section 4.1.2. Section 4.1.3 presents an analysis of drilling occurrences by depth for all wells drilled in the period 1978 to 1987 inclusive. The analysis covers the drilling operations of only some 62 000 wells and it should be recognized that more than one occurrence took place in some wells.

Sections 4.2, 4.3, and 4.4 address blow and blowout occurrences for well servicing and other operations as well as drilling. The numbers of blow and blowout occurrences, along with the operation being conducted at the time of the occurrence, are summarized in Section 4.2.1 for 1987. A summary of the causes of blows and blowouts by operation is presented in Section 4.2.2. A 10-year historical summary of blow and blowout occurrences by operation is provided in Section 4.2.3. Section 4.2.4 presents a 10-year summary of blowout occurrences for any sour fluids released.

A summary of each of the 6 blow and 17 blowout occurrences in 1987 is presented in Section 4.3. Specific information to identify the well and the operations being conducted at the time of the occurrence, along with a brief description of the event, control procedures, cause, losses, injuries, and actions to prevent future occurrences, is provided. In some cases the exact cause and events leading to the occurrence are not fully known and have been postulated.

An abbreviated 10-year historical summary of blow and blowout occurrences is presented in Section 4.4.

The Appendix provides the definitions of terms used in the drilling occurrence summaries in this report.

4.1 Drilling Occurrences - Drilling Operations Only

4.1.1 Drilling Occurrences - 1987

Depth	Kicks	Blows	Blowouts
0 - 750	63	1	2
751 - 1 800	128	0	0
1 801 - 3 600	51	0	0
3 601 - 6 000	12	0	0
6 001+	0	0	0
Total	254	1	2

4.1.2 Historical Drilling Occurrences (including water flows) 1987 to 1979

KICKS

Depth (metres)	1987	1986	1985	1984	1983	1982	1981	1980	1979
0 - 750	63	63	98	69	58	67	113	117	78
751 - 1 800	128	97	154	116	94	58	89	118	88
1 801 - 3 600	51	66	94	92	69	44	72	88	83
3 601 - 6 000	12	4	8	4	2	3	15	23	20
6 001+	0	0	0	0	0	0	0	0	0
Total	254	230	354	281	223	172	289	346	269

BLOWS

Depth (metres)	1987	1986	1985	1984	1983	1982	1981	1980	1979
0 - 750	1	0	0	0	1	1	4	2	2
751 - 1 800	0	2	2	0	2	3	3	4	5
1 801 - 3 600	0	0	0	0	1	2	3	2	2
3 601 - 6 000	0	0	0	0	0	1	1	0	0
Total	1	2	2	0	4	7	11	8	9

BLOWOUTS

Depth (metres)	1987	1986	1985	1984	1983	1982	1981	1980	1979
0 - 750	2	2	1	0	0	2	1	2	1
751 - 1 800	0	0	0	2	1	0	1	0	0
1 801 - 3 600	0	0	0	2	0	2	0	0	1
3 601 - 6 000	0	0	0	0	0	0	0	0	0
6 001+	0	0	0	0	0	0	0	0	0
Total	2	2	1	4	1	4	2	2	2

LOST CIRCULATION

Depth (metres)	1987	1986	1985	1984	1983	1982	1981	1980	1979
0 - 750	853	856	1316	950	681	894	1060	1258	970
751 - 1 800	477	406	484	407	341	266	355	335	265
1 801 - 3 600	141	132	159	124	95	84	163	212	123
3 601 - 6 000	9	7	7	0	2	3	6	9	8
6 001+	0	0	0	0	0	0	0	0	0
Total	1480	1401	1966	1481	1119	1247	1584	1814	1366

WATER FLOWS

Depth (metres)	1987	1986	1985	1984	1983	1982	1981	1980	1979
0 - 100	9	12	8	11	5	7	10	33	5
101 - 200	5	8	1	7	3	5	9	7	1
201 - 300	0	5	8	1	2	1	3	6	0
301 - 400	3	2	2	0	2	1	2	2	0
401 - 750	0	0	6	3	2	5	4	10	2
751 - 1 800	3	1	6	1	14	5	4	11	4
1 801 - 3 600	1	0	4	0	13	1	0	12	0
3 601 - 6 000	0	0	0	0	0	0	0	0	0
Total	21	28	35	23	41	25	32	81	12

4.1.3 Drilling Occurrence Analysis - Drilling Operations 1978 to 1987

Occurrence Type								Occurrences Per 1000 Wells Drilled				
Depth of Occurrence	Cum Wells	Kicks	Blows	Blow-outs	Lost Circ	Water Flows	Total Occurr	Kicks	Blows	Blow-outs	Lost Circ	Water Flows
0- 500	61 810	390	8	6	7 733	196	8 333	6.30	0.13	0.10	125.11	3.15
501-1000	52 809	708	15	3	2 253	45	3 024	13.40	0.28	0.06	42.66	0.85
1001-1500	29 112	295	9	0	1 337	14	1 655	10.13	0.31	0.00	45.93	0.48
1501-2000	17 356	374	5	3	1 196	15	1 593	21.33	0.40	0.17	68.20	0.86
2001-2500	8 061	202	1	2	423	13	641	25.10	0.12	0.25	52.47	1.61
2501-3000	3 565	191	7	2	264	7	471	53.58	0.96	0.56	74.05	1.96
3001-3500	1 376	106	1	1	165	3	276	77.03	0.73	0.73	119.91	2.18
3501-4000	582	49	0	0	40	1	90	84.19	0.00	0.00	68.73	1.72
4001-4500	284	41	1	0	13	1	56	145.91	3.52	0.00	45.77	3.52
4501-5000	150	20	0	0	15	0	35	133.33	0.00	0.00	100.00	0.00
5000 +	47	9	1	0	1	0	11	191.49	21.28	0.00	21.28	0.00
Total	61 810	2 385	48	17	13 440	294	16 184	38.50	0.78	0.28	217.44	4.76

4.2 Blow and Blowout Occurrences - Drilling, Servicing, and Other Operations

4.2.1 Blow and Blowout Occurrences - 1987 - All Operations

Operation	Blows	Blowouts
Drilling	1	2
Servicing	2	2
Other	3	13
Total	6	17

4.2.2 Causes of Blows/Blowouts - 1987

Occurrence	Operation and Cause
Blows - 6	Drilling - 1 Human error - 1
	Servicing - 2 Human error - 2
	Other - 3 Equipment failure - 2 Inadequate well design - 1
Blowouts - 17	Drilling - 2 Human error - 1 Abnormally charged formation - 1
	Servicing - 2 Equipment failure - 1 Human error - 1
	Other - 13 Equipment failure - 6 Third-party damage - 3 Inadequate well design - 3 Unknown at publication - 1
Total - 23	

4.2.3 Blow and Blowout Occurrences (Historical Statistics) 1987 to 1978

	Blows		Blowouts			Total Blow/ Blowouts
	Drilling	Servicing & Other	Drilling	Servicing	Other	
1987	1	5	2	2	13	23
1986	2	6	2	4	12	26
1985	2	5	1	6	15	29
1984	0	3*	4	4	7	18
1983	4	4	1	3	9	21
1982	6	8	4	4	8	30
1981	11	3	2	3	8	27
1980	9	6	2	5	3	25
1979	9	2	2	5	5	23
1978	4	4	0	3	8	19
Total	48	46	20	39	88	241

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* Prior to 1984 many servicing and other blows were not recorded.

4.2.4 Blowout Occurrences with Sour Fluids Released (Historical Statistics) 1987 to 1978

	Drilling			Servicing			Other		
	Sweet	Sour	Total	Sweet	Sour	Total	Sweet	Sour	Total
1987	2	0	2	2	0	2	10	3	13
1986	2	0	2	3	1	4	11	1	12
1985	1	0	1	5	1	6	11	4	15
1984	4	0	4	4	0	4	5	2	7
1983	0	1	1	2	1	3	8	1	9
1982	3	1	4	1	3	4	7	1	8
1981	1	1	2	2	1	3	7	1	8
1980	2	0	2	5	0	5	2	1	3
1979	2	0	2	5	0	5	3	2	5
1978	0	0	0	2	1	3	7	1	8
Total	17	3	20	31	8	39	71	17	88

4.3 Blow/Blowout Summaries of Each Occurrence - 1987

A summary of each of the 23 blow/blowout occurrences for 1987 is presented in the following tabulations. The definitions regarding the type of occurrences and the operations at the time of the occurrences are provided in the Appendix.

BLOW/BLOWOUT SUMMARY

WELL NAME: ALTA ENVIRONMENT WATER WELL

LOCATION NE 1/4-36-110-4 LICENCE NO.: ________

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 1 September 1987 DURATION: 55.5 hours

OPERATION AT THE TIME OF OCCURRENCE

X DRILLING; _____ SERVICING; _____ OTHER

LICENSEE: N/A

CONTRACTOR: Elk Point Drilling

FORMATION: (Sand Zone) DEPTH: 45 - 51 m

FORMATION PRESSURE: Unknown kPa or DRILLING FLUID DENSITY: 1100 kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: ________

DESCRIPTION OF EVENT: Test hole drilled to 91 m with 1200 kg/m³ mud. Casing cemented to 47.5 m. While drilling out the cement plug, the blowout occurred.

CONTROL PROCEDURES: Killed well with 2372 kg/m³ mud (2.8 m³ pumped). Cemented well with good returns to surface.

CAUSE OF BLOW/BLOWOUT: Human error - improper procedure. Suspected gas accumulation in open hole section below the casing shoe which was released upon drill out.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Recommend casing be set prior to drilling to total depth.

HYDROCARBON AND/OR EQUIPMENT LOSS: Sweet gas estimated in excess of 110 x 10³ m³/d, 45-m drill pipe, rock bit.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: BP ET AL CHERHILL 6-23-56-6

LOCATION 00/06-23-056-06W5/0 LICENCE NO.: 0127512

OCCURRENCE

X BLOW; ____ BLOWOUT DATE: 23 November 1987 DURATION: 2 days

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; _____ SERVICING; X OTHER

LICENSEE: BP Canada Ltd.

CONTRACTOR: ____

FORMATION: Nordegg DEPTH: 1361 - 1365 m

FORMATION PRESSURE: 10 000 kPa or DRILLING FLUID DENSITY: ____ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping oil well

DESCRIPTION OF EVENT: Gas was blowing from the outlet on the casing bowl and out the surface casing vent.

CONTROL PROCEDURES: Tied into surface casing vent with a valve assembly. Installed line to the flare pit so the gas could be vented to the pit. A polymer freezing agent was injected into the surface casing vent. The well was packed with dry ice overnight to enable freezing of the wellhead. Well loaded up with fluid and killed itself.

CAUSE OF BLOW/BLOWOUT: Inadequate well design - inadequate cementing of production casing.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Improved primary cementing procedures.

HYDROCARBON AND/OR EQUIPMENT LOSS: Approximately 90 x 10^3 m^3 sweet gas, 8 m^3 produced water.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: UNIGAS ET AL TOOGA 11-10-114-3

LOCATION 00/11-10-114-03W6/0 LICENCE NO.: 0068929

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 3 January 1987 DURATION: 24 hours

OPERATION AT THE TIME OF OCCURRENCE

____ DRILLING; ____ SERVICING; X OTHER

Seismic operation

LICENSEE: Canterra Energy Ltd.

CONTRACTOR: Caribou Construction (Peace River)

FORMATION: Bluesky A DEPTH: 200.6 m

FORMATION PRESSURE: 14 000 kPa or DRILLING FLUID DENSITY: ____ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Capped gas well

DESCRIPTION OF EVENT: Cat operator hit and sheared off wellhead.

CONTROL PROCEDURES: The casing was exposed and the damage assessed. Replaced swedge and new wellhead assembly installed.

CAUSE OF BLOW/BLOWOUT: Third-party damage.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Contractors must be advised and supervised by licensee/operator to assure adequate safety precautions are being taken.

HYDROCARBON AND/OR EQUIPMENT LOSS: Minor gas loss, wellhead damage.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: DOME WILLESDEN GREEN 8-34-42-7

LOCATION 00/08-34-042-07W5/0 LICENCE NO.: 0124882

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 19 January 1987 DURATION: 25 minutes

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; X SERVICING; _____ OTHER

LICENSEE: Dome Petroleum Ltd.

CONTRACTOR: Hi Alta #1

FORMATION: Belly River E DEPTH: 1536 - 1550 m

FORMATION PRESSURE: 6200 kPa or DRILLING FLUID DENSITY: __________ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Flowing gas well

DESCRIPTION OF EVENT: The incident took place while tripping tubing out of the hole with the well on vacuum. While pulling the 19th joint of a 24-joint kill string the well blew in. The floorman attempted to insert stabbing valve but the pipe began to hydraulic out of the hole. Pipe rams were closed catching the bottom collar of the third joint (joint #21).

CONTROL PROCEDURES: An attempt was made to kill the well by pumping oil down the casing but this blew back out of the tubing. Preparations were made to snub the tubing into the well with the use of a winch. The annular preventer was closed and the pipe rams opened. The winch was engaged snubbing the tubing through the annular preventer and back down the hole. After one joint the tubing moved down under its own weight. Stabbing valve was installed. Pipe rams were closed and the well shut in.

CAUSE OF BLOW/BLOWOUT: Human error - failure to maintain well on vacuum.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Increased BOP training.

HYDROCARBON AND/OR EQUIPMENT LOSS: Approximately 4.0 m³ of frac oil.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: HB ET AL DOWL 10-32-30-15

LOCATION 00/10-32-032-15W4/0 LICENCE NO.: 0042262

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 23 July 1987 DURATION: 3 hours

OPERATION AT THE TIME OF OCCURRENCE

____ DRILLING; ____ SERVICING; X OTHER

LICENSEE: Dome Petroleum Ltd.

CONTRACTOR: ____

FORMATION: Second White Specks DEPTH: 921.7 - 924.8 m

FORMATION PRESSURE: 17 000 kPa or DRILLING FLUID DENSITY: ____ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Capped gas well

DESCRIPTION OF EVENT: A farmer working his field drove too close to the wellhead, striking it with his cultivator.

CONTROL PROCEDURES: Farmer notified ERCB. Operator sent to the scene. The well had bled down completely upon his arrival. The casing was then repaired.

CAUSE OF BLOW/BLOWOUT: Third-party damage.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Fence now built around the wellhead. Wellhead painted fluorescent orange. Landowners to be informed of the danger of working too close to wellheads.

HYDROCARBON AND/OR EQUIPMENT LOSS: Small volume of sweet gas.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: HB PANAM FINA 6-35-57-19

LOCATION 00/06-35-057-19W5/2 LICENCE NO.: 0018824

OCCURRENCE

X BLOW; ____ BLOWOUT DATE: 19 November 1987 DURATION: 5 hours

OPERATION AT THE TIME OF OCCURRENCE

____ DRILLING; ____ SERVICING; X OTHER

LICENSEE: Dome Petroleum Ltd.

CONTRACTOR:

FORMATION: Wabamun DEPTH: 3239.4 m

FORMATION PRESSURE: 32 000 kPa or DRILLING FLUID DENSITY: ____ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Flowing gas well

DESCRIPTION OF EVENT: Gas leak discovered by operator. Broken 12.5-mm valve on top cap of wellhead.

CONTROL PROCEDURES: Two men with breathing apparatus entered the lease area and shut the flow off by closing the master valve.

CAUSE OF BLOW/BLOWOUT: Equipment failure.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Scheduled maintenance checks.

HYDROCARBON AND/OR EQUIPMENT LOSS: 6.5×10^3 m^3 gas (30% H_2S).

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: DOME HB SUNDANCE 7-9-54-21

LOCATION 00/07-09-054-21W5/0 LICENCE NO.: 0049981

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 28 March 1987 DURATION: 11 days

OPERATION AT THE TIME OF OCCURRENCE

____ DRILLING; ____ SERVICING; X OTHER

LICENSEE: Dome Petroleum Ltd.

CONTRACTOR:

FORMATION: Triassic A DEPTH: 2193 - 3204 m

FORMATION PRESSURE: Unknown kPa or DRILLING FLUID DENSITY: ____ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Flowing gas well

DESCRIPTION OF EVENT: Surface casing vent flow.

CONTROL PROCEDURES: Attempted to kill well by pumping down casing with a 3% KCl solution. Flow did not decrease. Ran temperature log to determine gas source. Perforated casing and performed cement squeeze (twice) above source of gas to elminate flow.

CAUSE OF BLOW/BLOWOUT: Inadequate well design - inadequate cementing.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Improve primary cementing procedures.

HYDROCARBON AND/OR EQUIPMENT LOSS: Estimated flow (16×10^3 m³/d) 50 ppm H_2S.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: ESSO 87 R4-8 COLDLK 6-23-65-4

LOCATION 100/06-23-065-04W4/00 LICENCE NO.: 0130202

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 2 December 1987 DURATION: 5 hours

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; _____ SERVICING; X OTHER

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: Sedco Drilling Rig 93E

FORMATION: Clearwater DEPTH: 417 m

FORMATION PRESSURE: 7000 kPa or DRILLING FLUID DENSITY: ________ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Standing

DESCRIPTION OF EVENT: The BOPs were taken off and the derrick was laid down. Gas blew up the conductor-production casing annulus, causing several large craters around the rig structure to be formed.

CONTROL PROCEDURES: The gas pressure decreased soon after, flow stopped entirely after approximately 5 hours.

CAUSE OF BLOW/BLOWOUT: Unknown at publication.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Under review.

HYDROCARBON AND/OR EQUIPMENT LOSS: Small amount of sweet gas.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: ESSO 87 R4-8 COLDLK 6-23-65-4

LOCATION 100/06-23-065-04W/0 LICENCE NO.: 0130202

OCCURRENCE

____ BLOW; _X_ BLOWOUT DATE: 24 November 1987 DURATION: 22 hours

OPERATION AT THE TIME OF OCCURRENCE

_X_ DRILLING; _____ SERVICING; _____ OTHER

Coring

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: Sedco Drilling Canada Rig 93E

FORMATION: Clearwater DEPTH: 417 m

FORMATION PRESSURE: 7000 kPa or DRILLING FLUID DENSITY: 1095 kg/m^3

STATUS OF WELL AT TIME OF OCCURRENCE: Drilling

DESCRIPTION OF EVENT: While cutting a core in the Clearwater Formation, the well kicked. The HCR was opened and annular closed immediately. After approximately 1 minute the 203 mm diverter line plugged. Gas broached to surface 8 m east of rig and up through the rat hole. The well later bridged off restricting flow to surface.

CONTROL PROCEDURES: The well was killed by pumping 55 m^3 of 1600 kg/m^3 mud down drill pipe.

CAUSE OF BLOW/BLOWOUT: Abnormally charged formation. Overpressure in Clearwater Formation.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Equipment and procedural modifications.

HYDROCARBON AND/OR EQUIPMENT LOSS: Small volume of sweet gas, HCR valve damaged.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: IMP JUDY CREEK 10-22BL-63-11

LOCATION 00/10-22-063-11W5/0 LICENCE NO.: 0020128

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 8 April 1987 DURATION: 4 hours

OPERATION AT THE TIME OF OCCURRENCE

____ DRILLING; ____ SERVICING; X OTHER

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR:

FORMATION: Beaverhill Lake A DEPTH: 2766 - 2802 m

FORMATION PRESSURE: 28 000 kPa or DRILLING FLUID DENSITY: ____ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping oil well

DESCRIPTION OF EVENT: The casing parted due to a mechanical failure of a pin end at a depth of 19 m below surface. Upon failing the gap between the two pieces of casing opened up to approximately 40 cm. Wellbore fluids entered the surface casing annulus and flowed to surface.

CONTROL PROCEDURES: Pressure truck tied into production casing and began pumping $CaCl_2$ kill fluid down annulus. After pumping approximately 7 m³ of fluid, the flow stopped.

CAUSE OF BLOW/BLOWOUT: Equipment failure.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Improving control of pipe make-up.

HYDROCARBON AND/OR EQUIPMENT LOSS: 3 m³ oil, 97 m³ water.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: ESSO 85 D26-16 COLDLK 2-2-65-4

LOCATION 104/02-02-065-04W4/0 LICENCE NO.: 0114971

OCCURRENCE

____BLOW; X BLOWOUT DATE: 15 May 1987 DURATION: 28.5 hours

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; _____ SERVICING; X OTHER

Third steam cycle

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: Controlled Pressure Services Ltd.

FORMATION: Clearwater DEPTH: 546 - 582 m

FORMATION PRESSURE: 7000 kPa or DRILLING FLUID DENSITY: __________ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping crude bitumen (steam cyclic)

DESCRIPTION OF EVENT: Two failures of the wellhead had occurred prior to the failure on 15 May 1987 and had been controlled by plugging and freezing of the wellhead. On 15 May operators responded to a loud noise coming from the area. Upon investigation, the steam blow was coming from the D26-16 well.

CONTROL PROCEDURES: Steaming operations on D-26 pad were shut down. Brine was pumped down the well in an attempt to cool the effluent. The wellhead was then frozen with dry ice which allowed the replacement of the valve.

CAUSE OF BLOW/BLOWOUT: Equipment failure. A weld failed between the casing valve and a flange (which was bolted to the casing bowl flange). As a result the valve dropped off.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Review procedures for plugging and freezing of wellheads. Ensure the quality of welds.

HYDROCARBON AND/OR EQUIPMENT LOSS: Approximately 16 m³ effluent escaped, casing valve damaged.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: ESSO 84 N40 LEM COLDLK EX 7-5-65-3

LOCATION AL/07-05-065-03W4/0 LICENCE NO.: 0111555

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 18 July 1987 DURATION: 1 hour

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; _____ SERVICING; X OTHER

LICENSEE: Esso Canada Resources Ltd.

CONTRACTOR:

FORMATION: Clearwater DEPTH: 543.4 m

FORMATION PRESSURE: 7000 kPa or DRILLING FLUID DENSITY: ________ kg/m^3

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping crude bitumen (steam cyclic)

DESCRIPTION OF EVENT: Polish rod separated from the continuous rod string and blew out of the stuffing box.

CONTROL PROCEDURES: Operator shut in the adjacent infill wells. Pressure trucks were used to pump a water mixture down the well. The well died within 1 minute.

CAUSE OF BLOW/BLOWOUT: Equipment failure. The polish rod backed out of the continuous rod collar.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Investigate the feasibility of a locking mechanism on the polish rod continuous rod connection.

HYDROCARBON AND/OR EQUIPMENT LOSS: Approximately 0.1 m^3 produced water.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: ESSO 85 D21-18 COLDLK 1-11-65-4

LOCATION 05/01-11-065-04W4/0 LICENCE NO.: 0114821

OCCURRENCE

___ BLOW; X BLOWOUT DATE: 2 March 1987 DURATION: 1.5 hours

OPERATION AT THE TIME OF OCCURRENCE

___ DRILLING; X SERVICING; ___ OTHER

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: Citation Well Servicing

FORMATION: Clearwater A DEPTH: 542 m

FORMATION PRESSURE: 7000 kPa or DRILLING FLUID DENSITY: ___ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping crude bitumen (steam cyclic)

DESCRIPTION OF EVENT: Well was thought to be safely shut in for the night. At 02:00 h, 2 March 1987 the well was found to be flowing by the operator.

CONTROL PROCEDURES: The well was shut in at 03:30 h by proper closure of BOP by remote control.

CAUSE OF BLOW/BLOWOUT: Equipment failure - tubing hanger rubber (found jammed in pipe rams) prevented complete BOP closure.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Install tubing hanger below BOPs on wells left at night.

HYDROCARBON AND/OR EQUIPMENT LOSS: Approximately 5.5 m³ fluid.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: ESSO 85 D4-7 COLDLK 11-11-65-4

LOCATION 00/11-11-065-04W4/0 LICENCE NO.: 0116230

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 16 January 1987 DURATION: 2 hours

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; _____ SERVICING; X OTHER

Steam cycle

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: ____

FORMATION: Clearwater DEPTH: TVD/480 m

FORMATION PRESSURE: 7000 kPa or DRILLING FLUID DENSITY: ____ kg/m^3

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping crude bitumen (steam cyclic)

DESCRIPTION OF EVENT: Well went unmanned for approximately 2 hours. During this period the stuffing box developed a leak.

CONTROL PROCEDURES: Well was killed by pumping 120 m^3 brine down annulus.

CAUSE OF BLOW/BLOWOUT: Equipment failure. Stuffing box failed.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Scheduled maintenance checks on stuffing boxes.

HYDROCARBON AND/OR EQUIPMENT LOSS: 9 m^3 produced water.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: IMP UNIT JUDY CREEK 6-8BL-64-10

LOCATION 00/06-08-064-10W5/0 LICENCE NO.: 0050744

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 8 April 1987 DURATION: 2 hours

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; _____ SERVICING; X OTHER

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: ____________

FORMATION: Beaverhill Lake A DEPTH: 2561 - 2584 m

FORMATION PRESSURE: 24 200 kPa or DRILLING FLUID DENSITY: __________ kg/m^3

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping oil (gas lift) well

DESCRIPTION OF EVENT: Uncontrolled surface casing vent flow.

CONTROL PROCEDURES: Well was killed with KCl (32 m^3).

CAUSE OF BLOW/BLOWOUT: Inadequate well design.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Improved primary cementing procedures.

HYDROCARBON AND/OR EQUIPMENT LOSS: 160 m^3 hydrocarbon.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: GULF POC COLEMAN 8-33-10-4

LOCATION 00/08-33-10-04W5/0 LICENCE NO.: 0055546

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 29 April 1987 DURATION: 3 days

OPERATION AT THE TIME OF OCCURRENCE

____ DRILLING; ____ SERVICING; X OTHER

LICENSEE: Gulf Canada Resources Ltd.

CONTRACTOR:

FORMATION: Livingstone DEPTH: 3906 - 4009 m

FORMATION PRESSURE: 33 000 kPa or DRILLING FLUID DENSITY: ____ kg/m^3

STATUS OF WELL AT TIME OF OCCURRENCE: Flowing gas well

DESCRIPTION OF EVENT: Surface casing vent blow.

CONTROL PROCEDURES: 1 May 1987 well was killed with fresh water and repaired surface casing leak.

CAUSE OF BLOW/BLOWOUT: Indequate well design - sour gas from the Kootenay coal seams corroded a hole through a local mechanically damaged area (about 491.0 m) in the 244.5-mm intermediate casing. Continued exposure to H_2S eventually led to failure of both the tubing and the casing by sulphide stress cracking.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Improved primary cementing procedures. Greater care and attention to be used when setting down hole tools to ensure correct placement and operation of such tools.

HYDROCARBON AND/OR EQUIPMENT LOSS: Approximately 1 m^3 oil/water spilled (2% H_2S).

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: HUSKY WAINWRIGHT 8C-31-44-4

LOCATION 00/08-31-044-04W4/0 LICENCE NO.: 0125910

OCCURRENCE

X BLOW; ____ BLOWOUT DATE: 10 November 1987 DURATION: 20 minutes

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; X SERVICING; _____ OTHER

Tripping out tubing

LICENSEE: Husky Oil Operations Ltd.

CONTRACTOR: Jurassic #3

FORMATION: Nisku DEPTH: 654 - 660 m

FORMATION PRESSURE: 3400 kPa or DRILLING FLUID DENSITY: __________ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Flowing oil well

DESCRIPTION OF EVENT: Unseated packer and primary string and began pulling the tubing. Seven or 8 minutes later the well blew in.

CONTROL PROCEDURES: Pipe rams would not close as the hanger was lodged in the rams. Crew eventually freed the rams, lowered the tubing, and closed the blind rams.

CAUSE OF BLOW/BLOWOUT: Human error - swabbing.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Improve tripping procedures.

HYDROCARBON AND/OR EQUIPMENT LOSS: None.

INJURIES: 2 injuries.

BLOW/BLOWOUT SUMMARY

WELL NAME: HUSKY STAPLE LLOYD 3B-30-50-1

LOCATION 00/03-30-050-01W4/0 LICENCE NO.: 0096421

OCCURRENCE

X BLOW; ___ BLOWOUT DATE: 27 November 1987 DURATION: 4 hours

OPERATION AT THE TIME OF OCCURRENCE

___ DRILLING; X SERVICING; ___ OTHER

LICENSEE: Husky Oil Operations Ltd.

CONTRACTOR: Western Gold #1

FORMATION: Cummings D DEPTH: 653 - 655 m

FORMATION PRESSURE: 3500 kPa or DRILLING FLUID DENSITY: ___ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Suspended oil well

DESCRIPTION OF EVENT: Pulling rods and tubing out of hole. Well kicked. Before the rod BOP could be installed oil and water were blowing out the tubing. Shortly afterwards fluid was blowing out the annulus as well.

CONTROL PROCEDURES: Crew shut off the rig motor and unlatched the rod elevators. Twelve rods blew out of the tubing. Tried but failed to install the tubing stabbing valve. The BOPs were then closed and 2 pressure trucks tied on to the annulus. Shortly afterwards the flow was 100% water and tubing stabbing valve installed.

CAUSE OF BLOW/BLOWOUT: Human error - swabbing.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Improve tripping procedure.

HYDROCARBON AND/OR EQUIPMENT LOSS: Unknown, no equipment loss.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: PCP ET AL LEEDALE 7-24-43-4

LOCATION 00/07-24-043-04W5/0 LICENCE NO.: 0081570

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 22 January 1987 DURATION: 7 hours

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; _____ SERVICING; X OTHER

LICENSEE: PanCanadian Petroleum Ltd.

CONTRACTOR:

FORMATION: Banff A DEPTH: 2094 m

FORMATION PRESSURE: 18 200 kPa or DRILLING FLUID DENSITY: ________ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Flowing gas well

DESCRIPTION OF EVENT: Moisture from the well had migrated past the valve gate into the valve body. Upon freezing the ice expanded, shearing 6 of 8 studs which held the valve bonnet in place.

CONTROL PROCEDURES: Circulate well with kill fluid and replace valve.

CAUSE OF BLOW/BLOWOUT: Equipment failure.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Scheduled maintenance checks.

HYDROCARBON AND/OR EQUIPMENT LOSS: Small volume of sweet gas, casing valve.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: RANCHMEN'S ET AL SYLAKE 14-35-37-4

LOCATION 00/14-35-037-04W5/0 LICENCE NO.: 0117100

OCCURRENCE

X BLOW; ____ BLOWOUT DATE: 25 December 1987 DURATION: 9 hours

OPERATION AT THE TIME OF OCCURRENCE

____ DRILLING; ____ SERVICING; X OTHER

LICENSEE: Ranchmen's Resources Ltd.

CONTRACTOR:

FORMATION: Elkton DEPTH: 2298.5 - 2295.0 m

FORMATION PRESSURE: 17 000 kPa or DRILLING FLUID DENSITY: ____ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping oil well

DESCRIPTION OF EVENT: During normal operations, an O-ring seal in the stuffing box flange failed allowing oil and gas to spray out. The operator found the leaking flange during his normal rounds.

CONTROL PROCEDURES: Operator closed the wellhead BOP. It also leaked, necessitating killing the well by using a pressure truck to pump oil down the casing and later down the tubing after the flow had subsided.

CAUSE OF BLOW/BLOWOUT: Equipment failure. O-ring seal in the stuffing box failed. Wellhead BOP failed.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Scheduled maintenance checks.

HYDROCARBON AND/OR EQUIPMENT LOSS: Approximately 6 m³ oil, small amount of gas (3350 ppm H_2S).

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: SHELL TINDASTOLL 14-1-37-1

LOCATION 00/14-01-037-01W5/0 LICENCE NO.: 0130172

OCCURRENCE

X BLOW; ___ BLOWOUT DATE: 4 December 1987 DURATION: 16 hours

OPERATION AT THE TIME OF OCCURRENCE

X DRILLING; ___ SERVICING; ___ OTHER

Drilling surface hole

LICENSEE: Shell Canada Ltd.

CONTRACTOR: Adeco Drilling Rig #15

FORMATION: Paskapoo DEPTH: 249 - 254 m

FORMATION PRESSURE: Unknown kPa or DRILLING FLUID DENSITY: 1120 kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Drilling

DESCRIPTION OF EVENT: An influx of gas up the inside of the drill pipe occurred from the above interval while making a connection at 261 m in 311.2-mm surface hole.

CONTROL PROCEDURES: A high-pressure pumping unit was tied into the drill string and 20 m of 1225 kg/m³ mud was circulated to kill the well. A diverter system was installed to drill the remainder of the surface hole.

CAUSE OF BLOW/BLOWOUT: Human error - swabbing.

ACTIONS TO PREVENT FUTURE OCCURRENCES: In areas where shallow gas is expected while drilling surface hole, a diverter system should be installed.

HYDROCARBON AND/OR EQUIPMENT LOSS: Minimal hydrocarbon loss.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: TEXACO BIGORAY 6-12-52-9

LOCATION 100/06-12-052-09W5/0 LICENCE NO.: 0071128

OCCURRENCE

____ BLOW; X BLOWOUT DATE: 15 December 1987 DURATION: 6 hours

OPERATION AT THE TIME OF OCCURRENCE

____ DRILLING; ____ SERVICING; X OTHER

LICENSEE: Texaco Canada Resources Ltd.

CONTRACTOR:

FORMATION: Nisku C DEPTH: 2555 m

FORMATION PRESSURE: 21 940 kPa or DRILLING FLUID DENSITY: ____ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Pumping oil well

DESCRIPTION OF EVENT: During the operation of the well the polish rod broke, causing oil and gas to escape to atmosphere. The well could not be shut in because of a piece of packing stuck under the flapper of the stuffing box.

CONTROL PROCEDURES: A pressure truck line was connected to the casing outlet and 32 m³ of water pumped down the casing to kill the well.

CAUSE OF BLOW/BLOWOUT: Equipment failure. Broken polish rod.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Scheduled maintenance checks on stuffing boxes.

HYDROCARBON AND/OR EQUIPMENT LOSS: Approximately 19 m³ oil.

INJURIES: None.

BLOW/BLOWOUT SUMMARY

WELL NAME: WELLORE ET AL FBA 9-29-56-23

LOCATION 00/09-20-056-23W4/0 LICENCE NO.: 0115926

OCCURRENCE

____BLOW; _X_ BLOWOUT DATE: 30 September 1987 DURATION: 14 hours

OPERATION AT THE TIME OF OCCURRENCE

_____ DRILLING; _____ SERVICING; _X_ OTHER

LICENSEE: Wellore Energy Inc.

CONTRACTOR:

FORMATION: Basal Mannville G DEPTH: 985 - 986 m

FORMATION PRESSURE: 12 410 kPa or DRILLING FLUID DENSITY: ______ kg/m³

STATUS OF WELL AT TIME OF OCCURRENCE: Suspended gas well

DESCRIPTION OF EVENT: A farmer struck the wellhead with his combine, knocking off the master valve on the production flange bonnet.

CONTROL PROCEDURES: Installed a new production flange bonnet and master valve.

CAUSE OF BLOW/BLOWOUT: Third-party damage. Farmer combining at dusk.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Ensure that landowners/occupants are made aware of the danger of working too close to wellheads.

HYDROCARBON AND/OR EQUIPMENT LOSS: 54×10^3 m³ gas, 5 m³ crude oil.

INJURIES: None.

4.4 Historical Summary - Blow/Blowout Occurrences - 1987 to 1978

A brief summary of blow and blowout occurrences for the past 10 years appears in the following tabulation. The summary by well is in chronological order by year.

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
UNIGAS ET AL TOOGA 11-10-114-3 (W6M)	3 Jan 1987 (1)	200.6	Blowout Other (capped gas)	Small volume of sweet gas	Third-party damage
ESSO 85 D4-7 COLDLK 11-11-65-4 (W4M)	16 Jan 1987 (2 h)	480.0	Blowout Other (steam/crude bitumen cycle)	9 m³ produced water	Equipment failure
DOME WILLESDEN GREEN 8-34-42-7 (W5M)	19 Jan 1987 (25 min)	1 550.0	Blowout Servicing (flow gas)	4 m³ frac oil	Human error/failure to maintain well on vacuum
PCP ET AL LEEDALE 7-24-43-4 (W5M)	22 Jan 1987 (7 h)	2 094.0	Blowout Other (flow gas)	Small volume of sweet gas	Equipment failure
ESSO 85 D21-18 COLDLK 05/1-11-65-4 (W4M)	2 Mar 1987 (1.5 h)	542.0	Blowout Servicing (steam/crude bitumen cycle)	5.5 m³ fluid	Equipment failure
DOME HB SUNDANCE 7-9-54-21 (W5M)	28 Mar 1987 (11)	3 204.0	Blowout Other (flow gas)	Approx. 16 x 10³ m³/d (50 ppm H_2S)	Inadequate well design
IMP JUDY CREEK 10-22BL-63-11 (W5M)	8 Apr 1987 (4 h)	2 802.0	Blowout Other (pump oil)	3 m³ oil, 97 m³ water	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
IMP UNIT JUDY CREEK 6-8-64-10 (W5M)	8 Apr 1987 (2 h)	2 584.0	Blowout Other (pump oil - gas lift)	160 m^3 hydrocarbon	Inadequate well design
GULF POC COLEMAN 8-33-10-4 (W5M)	29 Apr 1987 (3)	4 009.0	Blowout Other (flow gas)	Approx. 1 m^3 oil/ water	Inadequate well design
ESSO 85 D26-16 COLD LK 2-2-65-4 (W4M)	15 May 1987 (28.5 h)	582.0	Blowout Other (steam/crude bitumen cycle)	16 m^3 effluent	Equipment failure
ESSO 84 N40 LEM COLDLK EX AL/7-5-65-3 (W4M)	18 Jul 1987 (1 h)	543.4	Blowout Other (steam/crude bitumen cycle)	0.1 m^3 produced water	Equipment failure
HB ET AL DOWL 10-32-30-15 (W4M)	23 Jul 1987 (3 h)	924.8	Blowout Other (capped gas)	Small volume of gas	Third-party damage
ALTA ENVIRONMENT WATER WELL NE 1/4-36-110-4	1 Sep 1987 (55 h)	51.0	Blowout Drilling	110 x 10^3 m^3/d sweet gas, drill pipe and bit	Human error
WELLORE ET AL FBA 9-20-56-23 (W4M)	30 Sep 1987 (14 h)	986.0	Blowout Other (susp gas)	54 x 10^3 m^3 gas, 5 m^3 oil	Third-party damage

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
HUSKY WAINWRIGHT 8-31-44-4 (W4M)	10 Nov 1987 (20 min)	660.0	Blow Servicing (flow oil)	None	Human error - swabbing
HB PANAM FINA 6-35-57-19 (W5M)	19 Nov 1987 (5 h)	3 239.4	Blow Other (flow gas)	6.5 x 10^3 m^3 sour gas (30% H_2S)	Equipment failure
BP ET AL CHERHILL 6-23-56-6 (W5M)	23 Nov 1987 (2)	1 365.0	Blow Other (pump oil)	90 x 10^3 m^3 sweet gas, 8 m^3 produced water	Inadequate well design
ESSO 87 R4-8 COLD LK 6-23-65-4 (W4M)	24 Nov 1987 (22 h)	417.0	Blowout Drilling	Small volume of sweet gas	Abnormally charged formation
HUSKY STAPLE LLOYD 3-30-50-1 (W4M)	27 Nov 1987 (4 h)	655.0	Blow Servicing (susp oil)	Unknown	Human error - swabbing
ESSO 87 R4-8 COLDLK 6-23-65-4 (W4M)	2 Dec 1987 (5 h)	417.0	Blowout Other (standing)	Small volume of sweet gas	Unknown
SHELL TINDASTOLL 14-1-37-1	4 Dec 1987 (16 h)	254.0	Blow Drilling	Small volume of sweet gas	Human error - swabbing
TEXACO BIGORAY 6-12-52-9 (W5M)	15 Dec 1987 (6 h)	2 555.0	Blowout Other (pump oil)	19 m^3 oil	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
RANCHMEN'S ET AL SYLAKE 14-35-37-4	25 Dec 1987 (9 h)	2 295.0	Blow Other (pump oil)	6 m³ oil, small amount of gas (3350 ppm H_2S)	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
ROYALITE FINA SADDLE HILLS 6-3-76-8 (W6M)	6 Jan 1986 (2.5)	1 464.0	Blowout, Other (capped gas)	Small volume of sweet gas	Equipment failure
PCP LINDBERGH 1A-7-55-5 (W4M)	11 Jan 1986 (10 min)	582.0	Blow Servicing (steam/crude bitumen cycle)	2 m³ oil/water mix	Equipment failure
DOME ET AL 5A2 LINDBERGH 02/5-10-56-6 (W4M)	14 Jan 1986 (9 h)	640.0	Blowout Drilling	20 x 10³ m³ sweet gas	Lost circulation, possibly caused by producing well in same location
TCRL ET AL RIBSTONE 14B-18-43-4 (W4M)	15 Jan 1986 (1 h)	756.0	Blow Drilling	Small volume of sweet gas	Unexpected gas pocket
OAK ET AL ENCHANT 14-27-13-15 (W4M)	14 Mar 1986 (1.5)	874.0	Blow Drilling	84 x 10³ m³ sweet gas, 95 m³ formation water	Swabbed well while tripping
BANFF GUYER BASHAW 10-6MU-42-22 (W4M)	12 Apr 1986 (8 h)	1 759.0	Blow Other (pump oil)	2 m³ oil 2 m³ salt water Small volume of sour gas (12% H_2S)	Equipment failure
ESSO 84 H2-7 COLD LAKE 05/15-21-65-4 (W4M)	12 Apr 1986 (1.25)	452.0	Blowout, Other (steam/crude bitumen cycle)	60 m³ mixture of oil, sand and water	Equipment failure
AMOCO BRAZEAU RIVER 10-9-45-12 (W5M)	25 Apr 1986 (7 h)	3 416.0	Blowout Servicing (capped gas)	Very small volume of sour gas (6.7% H_2S)	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
MOBIL PR CARSON 6-12-62-12 (W5M)	13 May 1986 (12 h)	2 635.3	Blowout Other (susp)	5 m³ oil, 139 m³ produced water	Equipment failure
BUMPER ET AL ROSE CREEK 16-20-44-6 (W5M)	24 May 1986 (30 min)	2 240.5	Blow Servicing (capped gas)	Very small volume of sweet gas, 1 injury	Equipment failure
HB ET AL JACKFISH 02/11-36-59-21 (W5M)	30 May 1986 (5 min)		Blow Servicing (flow gas)	Very small volume of sour gas (18.6% H_2S)	Equipment failure
SUNCOR-WECO FORT KENT EX AJ/7-28-61-4 (W4M)	5 Jun 1986 (35 min)	366.6	Blowout Servicing (crude bitumen pumping)	11 m³ oil/water mix	Procedural error
PEX WHITECOURT 10-18-60-11 (W5M)	27 Jun 1986 (2 h)	1 680.0	Blowout Other (flow gas)	Very small volume of sweet gas	Equipment failure
HUSKY CWWE EOR BEAVDM EX AA/14-27-60-3 (W5M)	2 Aug 1986 (6 h)	406.0	Blowout Other (steam/crude bitumen cycle)	1 m³ oil	Equipment failure
DOME ET AL LARNE 10-1-117-4 (W6M)	6 Aug 1986 (11)	1 439.0	Blowout Other (standing oil)	112 x 10³ m³ sweet gas, well lost	Procedural error

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
PEX UNIT 1 KINSELLA B0/8-24-48-9 (W4M)	12 Aug 1986 (2)	677.6	Blowout Other (oil well/ oxygen flood)	Small volume of sweet gas	Equipment failure
COX TREND AMOCO CARSONW B4-12-62-13 (W5M)	21 Aug 1986 (12 h)	2 773.0	Blowout Other (oil)	16 m^3 oil/water mix	Equipment failure
ESSO 85 D22-2 COLD LAKE 03/7-11-65-4 (W4M)	22 Aug 1986 (3.75)	564.0	Blowout Other (steam/crude bitumen cycle)	400 m^3 oil/water mix	Equipment failure
PROPHET ET AL PEMBINA 02/6-25-49-6 (W5M)	28 Aug 1986 (6.5 h)	1 809.0	Blowout Other (standing oil)	0.5 m^3 oil, very small volume of gas (0.1% H_2S)	Equipment failure
LAC ET AL MINEHEAD 6-18-49-17 (W5M)	29 Aug 1986 (5)	2 436.0	Blowout Servicing (capped gas)	56 x 10^3 m^3 sweet gas, 12 m^3 frac oil, 2 fatalities, 8 injuries	Human error
DOME ET AL GORDONDALE 8-29-78-11 (W6M)	10 Sep 1986 (12 h)	1 878.0	Blow Other (oil)	0.5 m^3 oil 10 x 10^3 m^3 sour gas (1.5% H_2S)	Equipment failure
IMP UNIT CDN-SUP PEM INJ 6-25-49-6 (W5M)	21 Sep 1986 (1 h)	1 295.0	Blow Other (water inj)	3 m^3 salt water	Vehicle backed into wellhead

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
ANADARKO ET AL HAYS 10-29-13-15 (W4M)	26 Oct 1986 (4 h)	813.8	Blowout Other (capped gas)	21 x 10^3 m^3 sweet gas	Third-party damage
CDGOC TEEN MUSKEG EX AJ/16-9-95-7 (W4M)	18 Nov 1986 (5 h)	185.0	Blowout Servicing (crude bitumen pump)	2.5 m^3 oil/water mix	Procedural error
WESTMIN BEAUVALLON 16-24-53-8 (W4M)	26 Nov 1986 (20 h)	490.0	Blowout Other (capped gas)	Small volume of sweet gas	Third-party damage
LOMALTA TABERS 02/2-17-7-16 (W4M)	28 Nov 1986 (17)	995.0	Severe abnormal pressure encountered Drilling	No hydrocarbon loss	Abnormally high pressure zone, caused by adjacent water injection project
ESSO 86 J12-3 COLD LAKE 03/9-15-65-4 (W4M)	13 Dec 1986 (1)	465.0	Blowout Drilling	Very small volume of sweet gas	Abnormally high pressure zone, caused by adjacent steam injected project

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
SUNCOR WECO K3C FTKENT EX 9-19-61-4 (W4M)	10 Jan 1985 (3 h)	380.0	Blowout Other (steam/crude bitumen cycle)	2 m³ crude bitumen and water (steam)	Equipment failure
PCI BITU 5-85-23 OV 4-19-96-10 (W4M)	19 Jan 1985 (5)	26.0	Blowout Drilling (tripping)	No estimate of sweet hydrocarbon loss, major rig damage, 2 injuries	Unexpected shallow gas pocket
SUNCOR WECO 15E FTKENT EX 15-20-61-4 (W4M)	23 Jan 1985 (4.5 h)	340.0	Blowout Other (steam/crude bitumen cycle)	2 m³ crude bitumen and produced water, minor piping damage	Equipment failure
PCP ALDERSON 9-3-16-15 (W4M)	23 Jan 1985 (1)	1 026.0	Blowout Other (flow oil)	5 m³ oil (0.6% H_2S in gas), wellhead damage	Equipment failure
CHEVRON MGSU #1 MITSUE 13-4-70-3 (W5M)	5 Feb 1985 (9 h)	890.0	Blow Drilling	No estimate of sweet hydrocarbon loss	Lost circulation
UNIGAS ET AL TOOGA 7-15-114-4 (W6M)	3 Mar 1985 (2)	218.0	Blowout Other (flow gas)	30 x 10³ m³ sweet gas, wellhead damaged by fire	Static electricity
PARA ET AL LIEGE 7-26-94-18 (W4M)	5 Mar 1985 (3.5)	285.0	Blowout Other (capped gas)	90 x 10³ m³ sweet gas, wellhead damage	Third-party damage, van hit the wellhead

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CDNOXY ET AL CROSSE 10-22-27-29 (W4M)	14 Mar 1985 (3 h)	2 702.0	Blow Other (flow gas)	1 m^3 gas (34% H_2S)	Equipment failure
DOME LINDBERGH 5-18-55-5 (W4M)	19 Apr 1985 (4.5 h)	592.0	Blowout Other (steam/crude bitumen cycle)	50 m^3 crude bitumen, wellhead damage	Equipment failure
PCP ALDERSON 2-4-62-2 (W5M)	24 Apr 1985 (4 h)	738.0	Blowout Other (capped gas)	12.5 x 10^3 m^3 sweet gas	Third-party damage
HB UNION KAYBOBS 2-4-62-20 (W5M)	3 May 1985 (6 h)	2 155.0	Blowout Other (pump oil)	24 m^3 oil, 6 x 10^3 m^3 gas (2% H_2S), wellhead damage	Third-party damage
LANDBANK ET AL KILLAM 11-7-43-10 (W4M)	21 Jun 1985 (8 h)	637.0	Blowout Other (flow gas)	3 x 10^3 m^3 sweet gas, minor wellhead damage	Static electricity
CO-ENERCO ET AL CARROT 6-21-53-13 (W5M)	4 Jul 1985 (0.5 h)	2 130.0	Blow Servicing	5 m^3 load oil, 2.3 x 10^3 m^3 gas	
CDN-SUP KEGR 10-21-103-4 (W6M)	19 Jul 1985 (4)	487.0	Blowout Other (capped gas)	150 x 10^3 m^3 sweet gas, wellhead damage	Third-party damage

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
JEFF LAKE ET AL JOFFRE 12-20-38-26 (W4M)	24 Jul 1985 (2)	2 209.0	Blowout Other (pump oil)	10 x 10^3 m^3 gas (4% H_2S)	Equipment failure
WESTMIN LINDBERGH 13-05-55-5 (W4M)	26 Jul 1985 (0.5 h)	513.0	Blowout Servicing (crude bitumen)	2 m^3 crude bitumen, 2 x 10^3 m^3 sweet gas, crop damage	Well inadequately killed
BRACELL MOBIL HAYNES 3-14-38-24 (W4M)	27 Jul 1985 (3 h)	1 853.0	Blow Other (pump oil)	No estimate of hydrocarbon loss (15% H_2S)	Equipment failure
PETROMK ET AL DRUM 10-28-30-19 (W4M)	2 Aug 1985 (13 h)	1 289.0	Blowout Servicing (flow gas)	28 x 10^3 m^3 sweet gas, wellhead damage, 1 injury	Equipment failure
SUNCOR WECO M2D FTKENT EX 11-28-61-4 (W4M)	4 Aug 1985 (6 h)	557.0	Blowout Other (steam/crude bitumen cycle)	8 m^3 crude bitumen, minor wellhead damage	Down-hole communication between wells
SHELL 60 PRISP CADOT EX 27/AB 13-16-85-18 (W5M)	10 Sep 1985 (2 h)	551.0	Blowout Servicing (steam/crude bitumen cycle)	5 m^3 crude bitumen	Well inadequately killed
DOME ET AL LINDBERGH 15-18-55-5 (W4M)	5 Oct 1985 (5 h)	581.0	Blowout Other (steam/crude bitumen cycle)	No estimate of hydrocarbon loss	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
DOME HOME AMBER 12-36-115-7 (W6M)	1 Nov 1985 (5)	1 523.0	Blow Drilling	No hydrocarbon loss, small amount of gas (2% H_2S)	Hole conditions, fluid density inadequate
WECO 10 FT KENT EX 7-28-61-4 (W4M)	7 Nov 1985 (13.5 h)	334.0	Blowout Servicing (steam/crude bitumen cycle)	0.5 m^3 oil, 60 m^3 steam and produced water	Unexpected sand bridge
SUNCOR CWWE M2H FTKENT EX 14-28-61-4 (W4M)	10 Nov 1985 (1.25 h)	350.0	Blow Other (steam/crude bitumen cycle)	0.2 m^3 crude bitumen, 6.2 m^3 produced water	Equipment failure
HEWITT CHEVRON GSPIKE 2-35-51-27 (W4M)	19 Nov 1985 (6 h)	1 320.0	Blowout Other (capped gas)	No estimate of hydrocarbon loss, small amount of gas (trace H_2S)	Equipment failure
SUNCOR WECO M2F FTKENT 11-28-61-4 (W4M)	4 Dec 1985 (1.75 h)	340.0	Blowout Servicing (steam/crude bitumen cycle)	3 m^3 crude bitumen, 13 m^3 salt water	Procedural error
AQUIT MOBIL RAINBOWS 7-34-107-10 (W6M)	9 Dec 1985 (6)	1 852.0	Blowout Servicing	170 x 10^3 m^3 gas (20% H_2S), 50 m^3 condensate, 1 injury	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
AMOCO BEAVERDAM EX 16-13-59-2 (W4M)	21 Dec 1985 (0.5 h)	546.0	Blow Other (steam/crude bitumen cycle)	2 m³ crude bitumen and water, minor wellhead damage	Equipment failure
DOME ET AL 4B LIND EX 4-24-55-6 (W4M)	25 Dec 1985 (0.75 h)	585.0	Blowout Other (steam/crude bitumen cycle)	No losses	Inadequate cementing procedures on production casing

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
DOME ET AL FERRIER 8-33-38-7 (W5M)	3 Feb 1984 (2.5)	2 610.0	Blowout Drilling (coring)	706 x 10^3 m^3 sweet gas, manifold	Abnormal pressure, equipment failure, inadequate mud weight
PEMBINA ET AL FERRIER 6-29-38-7 (W5M)	14 Feb 1984 (1.5)	2 687.0	Blowout Drilling (tripping)	470 x 10^3 m^3 sweet gas, 150 barrels condensate	Swabbing and procedural error
PAN AM AP-2 SWAN H 02-12-67-11 (W5M)	3 Mar 1984 (30 min)	2 656.0	Blowout Other (pump oil)	No estimate of sweet hydrocarbon loss	Third-party damage, backhoe hit wellhead
CS WESTCOAST A4 SUGDEN EX AA/6-13-63-8 (W4M)	19 Mar 1984 (3.5)	382.0	Blowout Servicing (tripping)	No estimate of sweet hydrocarbon loss	Swabbing, failure to keep hole full, incorrect procedure to shut in well
PCP ET AL PRINCESS 4-4-19-10 (W4M)	6 Jun 1984 (0.5)	977.0	Blowout Drilling (tripping)	305 x 10^3 m^3 sweet gas, shock hose	Swabbing and/or failure to keep hole full, equipment failure
CS CARROT 10-26-52-12 (W5M)	25 Jun 1984 (0.5)	2 117.0	Blowout Other (pump oil)	4.5 m^3 oil, 4 x 10^3 m^3 sweet gas, wellhead damaged by fire	Equipment failure
GASCAN ET AL MITSUE 14-4-69-3 (W5M)	1 Jul 1984 (6 h)	1 692.0	Blowout Drilling	42 x 10^3 m^3 sweet gas	Inadequate cementing, incorrect procedure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
IMP JUDY CREEK 10-3-64-11 (W5M)	5 Sep 1984 (6 h)	2 696.0	Blowout Other (pump oil)	16 m^3 oil, 70 m^3 water and minor gas, wellhead damage	Third-party damage, truck ran over well
DRUMMOND ET AL CLARESHOLM 6-30-12-25 (W4M)	24 Sep 1984 (3.5)	2 043.0	Blowout Other (flow gas)	830 x 10^3 m^3 gas (1% H_2S), wellhead damage	Procedural error - incorrect procedure injecting methanol
AQUIT AMOCO RICINUS 7-15-34-8 (W5M)	10 Oct 1984 (0.5)	4 121.0	Blow Other (flow gas)	No estimate of hydrocarbon loss, small volume of gas (34% H_2S)	Equipment failure
PAN AM CALSTAD PIGEON LAKE IR 6 16-24-46-28 (W4M)	19 Oct 1984 (7 h)	2 155.0	Blowout Servicing	No estimate of hydrocarbon loss, wellhead damage	Equipment failure
DOME ET AL STRACHAN 13-8-37-9 (W5M)	23 Oct 1984 (1)	3 312.0	Blowout Servicing (frac job)	No estimate of sweet hydrocarbon loss	Procedural error
CS GRANADA 6-30-52-11 (W5M)	25 Oct 1984 (6 h)	2 109.0	Blowout Other (pump oil)	2 m^3 oil, 500 m^3 sweet gas	Equipment failure
DEKALB ET AL NEVIS 10-35-40-22 (W4M)	26 Oct 1984 (0.5)	376.0	Blowout Servicing (frac job)	1.4 x 10^3 m^3 sweet gas, minor wellhead damage	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
HB BRAZEAU RIVER 7-31-46-14 (W5M)	29 Nov 1984 (0.5)	3 655.0	Blow Other (flow gas)	5300 m³ gas (19.7% H_2S)	Equipment failure
RANGER GULF EDSON 11-11-53-20 (W5M)	30 Nov 1984 (5 min)	2 111.0	Blow Other (flow gas)	No estimate of sweet hydrocarbon loss	Equipment failure
GULF RAINBOW 11-36-110-6 (W6M)	14 Dec 1984 (30 min)	1 650.0	Blowout Other (capped gas)	No estimate of hydrocarbon loss (0.96% H_2S), 1 injury	Third-party damage, truck moving service rig damaged wellhead
UNION SLAVE 14-36-83-14 (W5M)	15 Dec 1984 (5 h)	1 750.0	Blowout Other (flow oil)	No estimate of sweet hydrocarbon loss, minor wellhead damage	Third-party damage, 4-wheel drive seismic tractor backed into well

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
GASCOME N. FRONTIER RAIN S 10-22-107-10 (W6M)	30 Jan 1983 (0.5)	1 961.0	Blowout Servicing (rigging up)	9.5 m³ oil, 1400 m³ gas (trace H_2S), minor wellhead damage	Service rig backed into well, broke valve off
TENN N-6 HUSSAR 15-3-25-21 (W4M)	20 Feb 1983 (1)	1 475.0	Blowout Other (capped oil)	20 m³ oil, 18 400 m³ sweet gas	Equipment failure
UNION BOYER 11-10-102-24 (W5M)	26 Feb 1983 (1 h)	357.0	Blowout Other (flow gas)	No estimate of sweet hydrocarbon loss, minor wellhead damage	Third-party damage, grey nipple knocked off wellhead by caterpillar tractor
CONGASCOME ET AL SHEKILIE 12-14-118-8 (W6M)	27 Feb 1983 (9)	1 794.0	Blowout Drilling (logging)	610 x 10³ m³ gas (2% H_2S)	Lost circulation
SUNCOR ET AL FTKENT 3-15-61-5 (W4M)	13 Mar 1983 (1)	343.0	Blow Drilling (tripping)	No estimate of sweet gas loss	Swabbing, procedural error (drill pipe and collars dropped down hole)
QUINTANA ET AL GOLDEN 9-24-86-15 (W5M)	16 Mar 1983 (2)	1 620.0	Blow Drilling (cementing)	50 x 10³ m³ sweet gas	Inadequate mud density
HOME ESSO KITSCOTY 3B-2-51-2 (W4M)	17 Mar 1983 (4)	603.0	Blowout Other (steam/oil cycle)	330 m³ water, 220 m³ oil, no estimate of sweet gas, wellhead damage	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
HB UNION KAYBOB S 10-5-62-20 (W5M)	22 Mar 1983 (4 h)	2 177.0	Blowout Other (pump oil)	13 m^3 oil, 13 300 m^3 gas (1.5% H_2S)	Equipment failure
PETROMK ET AL UTIKUMA 2-16-81-9 (W5M)	11 May 1983 (4 h)	1 744.0	Blowout Other (steam/crude bitumen cycle)	35 m^3 oil, 400 m^3 gas, minor wellhead damage	Third-party damage, casing valve broken off wellhead by truck
PCP GLEICHEN 6-11-23-21 (W4M)	22 May 1983 (7 h)	801.0	Blowout Servicing (re-installing wellhead)	No estimate of sweet hydrocarbon loss, 1 injury	Wellhead blown off, cross-threaded
YORK 2TV 3 IN DECALTA 6-20-18-2 (W5M)	28 Jun 1983 (3 min)	2 446.0	Blow Servicing (tripping)	No estimate of sweet hydrocarbon loss, 3 injuries	Trapped gas in tubing, suddenly released at surface
NORCEN K9 PROVO EX C1 6-17-37-1 (W4M)	6 Jul 1983 (1)	743.0	Blowout Other (air inj)	No estimate of sweet hydrocarbon loss, wellhead and tubing damage	Direct cause unknown, 3 joints tubing blown out of well
MERLAND DEMAY 1-17-48-19 (W4M)	18 Jul 1983 (2)	481.0	Blowout Other (susp gas)	No estimate of sweet hydrocarbon loss	Inadequate cement job on production casing string (surface casing vent blow)

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CS WESTCOAST SUGDEN EX 6-13-63-8 (W4M)	2 Aug 1983 (1)	380.0	Blow Servicing	2 m^3 sweet gas	Equipment failure
GULF AMOCO CAROLINE 8-17-36-6 (W5M)	5 Sep 1983 (2)	2 529.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Swabbing
GCON ET AL AQUIT LENDRUM 6-1-48-19 (W5M)	17 Sep 1983 (5 min)	95.0	Blow Servicing (re-entry)	No estimate of sweet hydrocarbon loss, 2 injuries	Unanticipated high pressure gas below bridge plug
SIGNALTA ET AL PEMBINA 4-31-50-6 (W5M)	28 Sep 1983 (6 h)	1 712.0	Blowout Other (susp gas)	14 000 m^3 gas, minor water	Third-party damage, casing valve broken off wellhead by truck
IMP JUDY WEST 10-18-63-11 (W5M)	3 Nov 1983 (2 h)	2 657.0	Blow Other (pump oil)	30 m^3 oil, 4200 m^3 sweet gas	Equipment failure
TEXACO C4 WIZARD 8-16MU-48-27 (W4M)	8 Nov 1983 (1)	1 886.0	Blowout Servicing (installing BOPs)	740 x 10^3 m^3 sweet gas	Equipment failure
PACIFIC AMOCO RICINUS 15-12-36-9 (W5M)	21 Nov 1983 (1)	2 617.0	Blowout Other (flow gas)	5000 m^3 sweet gas	Equipment failure

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
ANDEX ET AL PEMBINA 14-11-50-4 (W5M)	22 Nov 1983 (0.5)	1 585.0	Blow Drilling	No estimate of sweet hydrocarbon loss	Inadequate mud density

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CANHUNTER ET AL MUDDY 7-1-68-12 (W6M)	14 Jan 1982 (2 min)	2 441.0	Blow Servicing (wireline operations)	No estimate of sweet hydrocarbon loss, wireline truck, 3 pick-ups, minor service rig damage, 5 injuries	Equipment failure
HB ZAMA NORTH 12-11-116-6 (W6M)	14 Jan 1982 (1.5)	1 546.0	Blowout Other (flow oil)	14 m³ oil, 7 m³ gas (9% H_2S)	Equipment failure
DOME SULPETRO VALHALLA 8-23-74-9 (W6M)	18 Jan 1982 (4)	2 042.0	Blowout Drilling (tripping)	3600 x 10³ m³ gas (trace H_2S), 150 barrels condensate	Failure to keep hole full while tripping out, followed by BOP failure
SUNCOR WECO FT KENT EX 4-28-61-4 (W4M)	26 Jan 1982 (1)	396.0	Blow Servicing	No estimate of sweet hydrocarbon loss, 1 injury	Equipment failure
MYROL BVX STETN 6-19-39-19 (W4M)	28 Jan 1982 (1)	1 345.0	Blowout Other (flow gas)	280 x 10³ m³ sweet gas, minor wellhead damage	Third-party damage
C&T ET AL MEDR 14-20-39-3 (W5M)	2 Feb 1982 (1)	2 142.0	Blowout Servicing (tripping)	33 m³ oil, 450 m³ gas, 8 m³ salt water	Underbalanced fluid column in wellbore, insufficient kill fluid density
CANSTAR CALUMET OV 2-24-98-12 (W4M)	11 Feb 1982 (13)	65.0	Blowout Drilling	85 x 10³ m³ sweet gas, rig burned	Unexpected shallow gas sand, no BOPs installed

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
GAO JOLI FOU 7-32-80-20 (W4M)	14 Feb 1982 (0.5)	369.0	Blow Other (crude bitumen)	3 m³ oil	Equipment failure
CANTERRA ET AL RAINBOW 8-15-109-8 (W6M)	3 Mar 1982 (6)	1 782.0	Blow Drilling (tripping)	No estimate of hydrocarbon loss (trace H_2S)	Failure to keep hole full
HB SHEKILIE 4-11-118-8 (W6M)	10 Mar 1982 (2.5)	1 737.0	Blowout Servicing (removing wellhead)	2 m³ oil, 300 m³ gas (trace H_2S), wellhead and service rig damage	Winch line parted, dropping horsehead onto wellhead
UNIGAS ET AL SOUSA 6-11-112-4 (W6M)	15 Mar 1982 (0.5)	260.0	Blowout Other (standing gas)	No estimate of sweet hydrocarbon loss, wellhead damage	Third-party damage
UNION SLAVE 8-23-84-14 (W5M)	23 Mar 1982 (0.5)	78.0	Blow Drilling	No estimate of sweet hydrocarbon loss	Unexpected shallow gas zone
PROCOR FT SASK LPG STORAGE 16D-1-56-22 (W4M)	11 Apr 1982 (1)	1 909.0	Blowout Other (storage)	875 m³ butane, 3 buildings and pumps, 1 injury	Equipment failure
CIGOL BIG LK 10-22-53-26 (W4M)	29 Apr 1982 (19)	1 430.0	Blowout Other (susp gas)	No estimate of sweet hydrocarbon loss	Lake ice damaged equipment

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
PCP ALDERSON 14-15-15-15 (W4M)	16 May 1982 (0.5)	762.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Failure to keep hole full while tripping
CAIRN ET AL WAYNE 6-10-27-20 (W4M)	1 Jun 1982 (1)	1 424.0	Blowout Other (flow oil)	No estimate of sweet hydrocarbon loss, wellhead and pump-jack damage	Equipment failure
AMERADA STURLS 1-20-69-22 (W5M)	10 Jun 1982 (0.5)	2 602.0	Blow Other (flow oil)	7 m^3 oil, 1.4 x 10^3 m^3 gas (9% H_2S)	Equipment failure
DIASHAM AMOCO SPRUCE V 7-14-67-19 (W4M)	14 Jul 1982 (1)	370.0	Blowout Other (flow gas)	2.8 x 10^3 m^3 sweet gas, minor wellhead damage	Foremost all-terrain vehicle ran into wellhead, broke off 12-mm valve
IMP HB FENNBV 2-26-36-20 (W4M)	3 Sep 1982 (1)	1 594.0	Blowout Servicing (rigging up)	2.5 m^3 oil, 180 m^3 gas (1.5% H_2S)	Well improperly killed
REGAL ET AL PEMBINA 6-11-47-3 (W5M)	7 Sep 1982 (1)	285.0	Blow Other (pump oil)	No estimate of sweet hydrocarbon loss	Inadequate cement top behind production casing (surface casing vent blow)
DECALTA LEDUC 10-36-48-26 (W4M)	17 Sep 1982 (1)	1 385.0	Blowout Other (standing gas)	No estimate of sweet hydrocarbon loss	Third-party damage

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
GULF ET AL CRIMSON 7-5-38-8 (W5M)	21 Sep 1982 (11)	2 926.0	Blow Drilling (coring)	250 x 10^3 m^3 sweet gas	Abnormal formation pressure
CAMP TAMERACK LADCO WW NW 1/4-26-70-6 (W6M)	14 Oct 1982 (1)	198.0	Blowout Drilling	5 x 10^3 m^3 sweet gas	Water well driller had no BOP equipment
AMOCO DOME BRAZEAU RIVER 13-12-48-12 (W5M)	17 Oct 1982 (67)	3 066.0	Blowout Drilling (coring)	150 to 220 x 10^6 m^3 gas (includes 25% H_2S and 100 to 160 x 10^3 m^3 gas equivalent of condensate), drilling rig, 2 deaths (well control personnel), 300 hectares of forest	Combination of unsatisfactory practices and equipment failures (see Lodgepole Blowout Report D 84-9, Section 12.1.1)
WESTCOAST AEC SUFFIELD 5-10-20-8 (W4M)	6 Nov 1982 (2)	887.0	Blow Drilling (tripping)	25 x 10^3 m^3 sweet gas, minor rig damage, 3 injuries	Failure to keep hole full
FIRST DEV ET AL PEMBINA 4-28-50-12 (W5M)	19 Nov 1982 (1 h)	100.0	Blow Servicing (re-enter abandoned well)	No estimate of sweet hydrocarbon loss	Abnormal pressure due to inadequate abandonment

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
MOBIL PRISM RAIN 12-13-110-6 (W6M)	20 Nov 1982 (11)	1 853.0	Blowout Servicing (installing wellhead)	275 x 10³ m³ gas (1.5% H_2S), service rig and wellhead damage	Well inadequately killed
SUN MEDR 12-8-39-3 (W5M)	26 Nov 1982 (30 min)	2 206.0	Blow Servicing (hot oil job)	2 m³ oil	Polish rod hydrauliced out of stuffing box and broke off
GULF ET AL FERRIER 6-18-38-8 (W5M)	1 Dec 1982 (1)	2 930.0	Blow Drilling (coring)	130 x 10³ m³ sweet gas	Abnormally pressured formation
SECURITY GARRS 6-21-33-3 (W5M)	2 Dec 1982 (1)	1 938.0	Blow Servicing (frac job)	15 m³ oil	Equipment failure

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
LUSCAR ET AL FORESTBURG 4-29-41-15 (W4M)	9 Jan 1981 (0.5)	174.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Swabbing
TOTAL ATMORE 3-34-67-16 (W4M)	10 Jan 1981 (15 min)	356.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss, 1 injury	Failure to keep hole full
ESSO COLD LAKE 27A 6-27-64-3 (W4M)	20 Jan 1981 (2)	525.0	Blowout Other (crude bitumen)	No estimate of sweet hydrocarbon loss	Equipment failure (casing)
MERLAND ET AL KINSELLA 6-2-46-8 (W4M)	1 Feb 1981 (2)	638.0	Blowout Servicing (installing BOPs)	210 x 10^3 m^3 sweet gas	Well improperly killed
VOYAGER ET AL NORRIS 9-5-54-18 (W4M)	7 Feb 1981 (2 h)	188.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Swabbing
CS RAINBOW 3-32-109-5 (W6M)	15 Feb 1981 (2 h)	1 367.0	Blow Drilling (tripping)	6 m^3 oil, no estimate of sweet gas, minor rig damage, 1 injury	Failure to keep hole full

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CHEROKEE RETLAW 6-32-11-18 (W4M)	26 Feb 1981 (1.5)	1 075.0	Blow Drilling (tripping)	250 x 10^3 m^3 sweet gas	Swabbing
POC ET AL OBED 2-22-52-22 (W5M)	28 Mar 1981 (1 h)	4 225.0	Blow Servicing (logging)	6 x 10^3 m^3 gas (32% H_2S), minor service rig fire damage	Equipment failure
HB ET AL BRAZR 8-7-48-13 (W5M)	25 Apr 1981 (6)	3 379.0	Blow Drilling (tripping)	No estimate of hydrocarbon loss (0.6% H_2S)	Swabbing
PETROFINA TEST HOLE B5 13-6-51-7 (W5M)	15 May 1981 (1)	201.0	Blowout Drilling	28 x 10^3 m^3 sweet gas, fire damage to rig, 2 injuries	Air drilling with no diverter or BOPs
BANFF GUYER BASHAW 10-6MU-42-22 (W4M)	2 Jun 1981 (4)	1 760.0	Blowout Other (pump oil)	1 x 10^3 m^3 gas, 1 m^3 oil (12% H_2S)	Equipment failure
CHAMPLIN WHITECOURT 9-17-60-11 (W5M)	24 Jun 1981 (1)	1 602.0	Blow Other (capped gas)	40 x 10^3 m^3 sweet gas	Inadequate cement job on production casing string (surface casing vent blow)
HUBER TWINING 2-18-32-24 (W4M)	4 Jul 1981 (6)	1 684.0	Blowout Other (susp oil)	8 x 10^3 m^3 sweet gas, 4 m^3 oil, minor wellhead damage	Third-party damage

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CLP COLD LAKE 9-7-63-2 (W4M)	14 Jul 1981 (1)	260.0	Blowout Other (flow gas)	10 x 10^3 m^3 sweet gas	Third-party damage
BP ET AL LAMBERT 15-33-41-23 (W5M)	22 Jul 1981 (13)	4 414.0	Blow Drilling	No estimate of sweet hydrocarbon loss	Lost circulation
GAO ET AL FERRIER 10-1-40-9 (W5M)	23 Jul 1981 (1)	2 683.0	Blow Drilling	No estimate of sweet hydrocarbon loss	Abnormally pressured formation
HUSKY LLOYD 13-15-51-1 (W4M)	22 Aug 1981 (0.5)	49.0	Blow Drilling	No estimate of sweet hydrocarbon loss	Unexpected shallow gas pocket
GULF PECO 7-30-47-15 (W5M)	15 Sep 1981 (30 min)	2 503.0	Blow Drilling (fishing)	No estimate of sweet hydrocarbon loss	Pipe parted while jarring stuck DST tools
TEXACO ATHABASCA I-23 12-15-88-8 (W4M)	16 Sep 1981 (12)	354.0	Blowout Other (air inj)	No estimate of sweet hydrocarbon loss, casing and minor wellhead damage	Equipment failure
ROZSA KNAPPEN 9-6-2-11 (W4M)	25 Sep 1981 (2)	794.0	Blow Drilling (tripping)	500 x 10^3 m^3 sweet gas	Failure to keep hole full
SUNCOR COVEY NO. 11-7 11-7-47-27 (W4M)	16 Oct 1981 (1 h)	2 159.0	Blowout Servicing (tripping)	No estimate of sweet hydrocarbon loss	Well not properly killed

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CHEVRON BLGU 3 KAYBOB S 4-35-58-18 (W5M)	1 Nov 1981 (0.5)	3 396.0	Blowout Servicing (tripping)	125 x 10^3 m^3 gas (18% H_2S), 125 m^3 condensate, 16 m^3 salt water	Well not properly killed
BA PAN-AM RHONDA SWANH 4-14-66-11 (W5M)	8 Nov 1981 (1)	2 593.0	Blowout Other (pump oil)	No estimate of sweet hydrocarbon loss	Equipment failure
HB SHEKILIE 9-16-118-8 (W6M)	18 Nov 1981 (4)	1 548.0	Blowout Drilling (circulating)	1600 x 10^3 m^3 gas (0.66% H_2S), rig destroyed	Lost circulation
ASHLAND ET AL PEMBINA 11-33-50-8 (W5M)	22 Nov 1981 (1)	1 914.0	Blowout Other (standing gas)	No estimate of sweet hydrocarbon loss	Equipment failure
PARA ET AL WILD RIVER 10-8-55-25 (W5M)	30 Nov 1981 (2)	2 665.0	Blowout Other (standing oil)	No estimate of sweet hydrocarbon loss, wellhead damage	Equipment failure
IMP CDN SUP PEMBINA 16-29BR-48-6 (W5M)	10 Dec 1981 (1)	1 404.0	Blow Servicing (installing BOPs)	No estimate of sweet hydrocarbon loss	Wellhead froze, bonnet on master valve split

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
DOME AMOCO EUREKA 3-33-82-10 (W6M)	2 Jan 1980 (1)	1 916.0	Blowout Other (flow gas)	60 x 10^3 m^3 sweet gas wellhead damage, 1 injury	Equipment failure
PAN-AM CANSO A-1 NITON 12-15-55-13 (W5M)	9 Jan 1980 (1)	1 972.0	Blowout Servicing (clean-out job)	No estimate of sweet hydrocarbon loss, wellhead damage	Equipment failure
WESTCOAST ET AL BUFFALO 14-17-22-6 (W4M)	31 Jan 1980 (1)	775.0	Blow Drilling (tripping)	28 x 10^3 m^3 sweet gas	Failure to keep hole full, mud density inadequate
PANCANA MURPHY ATLEE 4-19-21-5 (W4M)	5 Feb 1980 (6)	840.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Lost circulation
BLAKE ET AL STEEN 10-9-112-1 (W6M)	7 Feb 1980 (25)	70.0	Blowout Drilling	No estimate of sweet hydrocarbon loss, major rig fire damage, 2 injuries	Unexpected shallow gas sand
BLAKE ET AL SOUSA 10-11-112-2 (W6M)	2 Mar 1980 (1)	265.0	Blow Drilling	No estimate of sweet hydrocarbon loss	Inadequate mud density
WESTGROWTH ET AL VIRGO 12-36-114-6 (W6M)	11 Mar 1980 (1)	1 501.0	Blow Other (susp well)	1 m^3 oil, wellhead	Third-party damage

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CHEVRON STEELE 13-20-65-24 (W4M)	18 Mar 1980 (0.5)	1 233.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Swabbing, failure to keep hole full
CANHUNTER TEXACO ELM 10-35-71-13 (W6M)	19 Jun 1980 (2)	2 007.0	Blowout Servicing (installing BOPs)	5.7 x 10^6 m^3 sweet gas	Well not properly killed
DOME MORGAN 6B-35-51-4 (W4M)	5 Jul 1980 (2 h)	586.0	Blowout Servicing (installing BOPs)	9 m^3 oil	Swabbing
NUGATE OAK PCP ALDERSON 8-14-16-15 (W4M)	29 Jul 1980 (1)	1 041.0	Blow Drilling (tripping)	10 m^3 oil, 28 x 10^3 m^3 sweet gas	Failure to keep hole full and/or swabbing
HOME PECO 6-1-47-16 (W5M)	10 Sep 1980 (1)	3 864.0	Blowout Other (susp gas)	No estimate of hydrocarbon loss (20% H_2S)	Casing valves left open, tubing parted and gas escaped out open valve
HOME PACIFIC KNAPPEN 16-29-1-11 (W4M)	12 Sep 1980 (1)	760.0	Blow Servicing (rigging up)	29 x 10^3 m^3 sweet gas	Equipment failure
WHITEHALL BUX ZAMA 4-20-116-6 (W6M)	18 Sep 1980 (2)	1 409.0	Blow Other (susp gas)	100 x 10^3 m^3 gas (2% H_2S)	Production casing failure due to corrosion (surface casing vent blow)

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
ESSO CHIEFCO RILEY 6-25-42-17 (W5M)	24 Sep 1980 (1)	5 300.0	Blow Drilling	No estimate of hydrocarbon loss (trace H_2S)	Abnormally pressured formation
CHEVRON CLARK 10-2-59-18 (W5M)	2 Oct 1980 (1)	3 272.0	Blow Servicing (killing well)	No estimate of hydrocarbon loss (8% H_2S), minor rig damage	Equipment failure
HB SWIMMING 6-8-52-6 (W4M)	8 Oct 1980 (1 h)	680.0	Blow Drilling	No estimate of sweet hydrocarbon loss	Lost circulation
CLARION ET AL BONNYVILLE 6-36-60-6 (W4M)	11 Oct 1980 (2 h)	327.0	Blowout Other (susp gas)	No estimate of sweet hydrocarbon loss, minor wellhead damage	Third-party damage
FINA AMOCO HB WIND 9-2-61-16 (W5M)	17 Oct 1980 (4 h)	2 533.0	Blow Servicing (tripping)	No estimate of hydrocarbon loss (20% H_2S)	Stabbing valve in tubing left open, well kicked in
TREND FBA 13-24-56-24 (W4M)	21 Oct 1980 (3 h)	577.0	Blowout Servicing (standing)	7 m^3 oil, 40 x 10^3 m^3 sweet gas	Casing valve left open overnight
TEXACO WIZARD LAKE B-2 5-22-48-27 (W4M)	28 Oct 1980 (1)	1 938.0	Blowout Servicing (tripping)	No estimate of sweet hydrocarbon loss	Lubricator removed before wireline pulled

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
HUSKY GCD NORTH KITSCOTY NO. 28	28 Nov 1980 (3 h)	577.0	Blowout Servicing	42 m³ oil, 14 m³ salt water	Well improperly killed prior to servicing
RENAISSANCE PETMT EDWAND 7-10-61-17 (W4M)	1 Dec 1980 (3)	648.0	Blowout Drilling	570 x 10³ m³ sweet gas, rig burned, 1 injury	Lost circulation, surface casing split

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
MESA CAROLINE 5-28-34-6 (W5M)	10 Jan 1979 (4)	1 975.0	Blowout Servicing (drilling)	480 m³ oil, 120 x 10³ m³ sweet gas	Poor cement job over Cardium
CDNOXY ET AL EAGLESHAM 9-9-77-25 (W5M)	18 Jan 1979 (1)	1 805.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Swabbing
COMPADRE SIBBALD 6-25-27-2 (W4M)	29 Jan 1979 (0.5)	904.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Swabbing, lost circulation
MOBIL WCT CARSON N 6-34-61-12 (W5M)	16 Feb 1979 (1.5)	2 623.0	Blowout Other (water inj)	No estimate of sweet hydrocarbon loss, casing valve	Equipment failure
SHELL RANDALL 12-10-81-2 (W5M)	26 Feb 1979 (1)	484.0	Blowout Drilling	No estimate of sweet hydrocarbon loss, fire damage to rig	Failure of bleed-off hose on blooey line while air drilling
AQUIT RAINBOW S 4-1-108-10 (W6M)	27 Feb 1979 (0.5)	1 902.0	Blowout Other (pump oil)	No estimate of hydrocarbon loss (4% H_2S), stuffing box, flow tee	Equipment failure
RUPERTS ET AL MITSUE 11-32-71-3 (W5M)	11 Apr 1979 (7)	1 660.0	Blow Drilling	1400 x 10³ m³ sweet gas	Lost circulation

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
IMPERIAL WOODBEND #74 8-8-51-26 (W4M)	17 Apr 1979 (15 min)	1 622.0	Blowout Servicing (pumping oil)	1.6 m³ oil	Human error, incorrect procedure
BLUESKY PETROMARK KMG SUNNY N 7-5-25-9 (W4M)	4 May 1979 (3 h)	872.0	Blowout Other (capped gas)	0.7 x 10³ m³ sweet gas	Wellhead came off - improperly installed
TEXACO MCMURRAY STEAM PROJECT Sec 15-88-8 (W5M)	11 Jun 1979 (12)	136.0	Blowout Other (crude bitumen)	No estimate of sweet hydrocarbon loss	Equipment failure
AMOCO ET AL BEARBERRY 10-32-32-7 (W5M)	13 Jun 1979 (1)	2 894.0	Blowout Servicing (frac job)	113 x 10³ m³ sweet gas, 1 injury	Equipment failure
NORCEN ET AL WESTLOCK 11-23-59-27 (W4M)	21 Jun 1979 (0.5)	730.0	Blow Drilling (circulating)	No estimate of sweet hydrocarbon loss	Lost circulation
AMOCO GRANADA 3-29-52-11 (W5M)	27 Aug 1979 (1.5)	2 090.0	Blowout Servicing (frac job)	140-280 x 10³ m³ sweet gas, 1 injury	Equipment failure
HARRY W BASS ET AL EDSON 7-26-51-19 (W5M)	30 Aug 1979 (7)	3 088.0	Blowout Other (susp gas)	No estimate of hydrocarbon loss (2% H_2S)	Equipment failure (casing)

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
PCP NUMAC TANGENT 6-32-80-23 (W5M)	30 Sep 1979 (1)	1 118.0	Blow Drilling (tripping)	25 x 10^3 m^3 sweet gas	Failure to keep hole full
ESSO UNION MUSREAU 16-28-64-6 (W6M)	3 Oct 1979 (1)	2 653.0	Blow Drilling (cementing)	No estimate of sweet hydrocarbon loss	Insufficient cement column behind intermediate casing
PACIFIC EMPRESS 13-35-19-1 (W4M)	6 Oct 1979 (0.5)	617.0	Blow Drilling (tripping)	460 m^3 sweet gas	Failure to keep hole full
ZAPATA ET AL FORESTBURG 11-23-40-15 (W4M)	13 Oct 1979 (1)	961.0	Blow Other (susp gas)	No estimate of sweet hydrocarbon loss, gauge needle valve	Possible vandalism - equipment failure
MOBIL UNIT BHL CARON N 14-1-62-12 (W5M)	27 Oct 1979 (1)	2 647.0	Blow Drilling (tripping)	28 x 10^3 m^3 sweet gas	Failure to keep hole full, hole in surface casing at 36 m
KISSINGER ET AL MILLS 7-35-70-11 (W4M)	7 Nov 1979 (0.5)	515.0	Blow Drilling (fishing)	No estimate of sweet hydrocarbon loss	Swabbing with fishing tools
AMOCO ET AL STEEP 7-28-66-7 (W6M)	22 Nov 1979 (3)	2 338.0	Blowout Drilling (fishing)	280 x 10^3 m^3 sweet gas	Swabbing with fishing tools

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
BRASCAN ET AL RANFURLY 2-5-51-12 (W4M)	23 Nov 1979 (0.5)	600.0	Blowout Servicing (tripping)	No estimate of sweet hydrocarbon loss	Lost circulation
GLENORA ET AL GUNN 10-8-55-3 (W5M)	2 Dec 1979 (6 h)	1 304.0	Blow Other (shut in)	No estimate of sweet hydrocarbon loss	Insufficient cement column behind production casing
GLENIS ET AL SIBBALD 10-16-28-2 (W4M)	7 Dec 1979 (1)	774.0	Blow Drilling (cementing)	27 x 10^3 m^3 sweet gas	Lost circulation

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
HB BL GAS UNIT 2 KAYBOB S 2-19-60-18 (W5M)	6 Jan 1978 (4.5)	3 322.0	Blowout Servicing (stripping in)	610 x 10^3 m^3 gas (18% H_2S)	Tubing slips jammed in BOPs
PCP WINTERING HILLS 10-16-25-18 (W4M)	23 Jan 1978 (3.5)	1 304.0	Blowout Other (flow gas)	No estimate of sweet hydrocarbon loss, casing valve	Equipment failure
NORCEN SIEBENS JUMPBUFF 8-18-20-19 (W4M)	12 Mar 1978 (5 min)	1 341.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss, fire damage to rig, 5 injuries	Swabbing, fire caused by drawworks motors
GULF MINNEHIK BUCK LAKE 9-25-44-6 (W5M)	14 Mar 1978 (3)	1 739.0	Blowout Other (standing gas)	250 x 10^3 m^3 gas, 32 m^3 water, minor wellhead damage	Failure to cement above shallow hydrocarbon zone
IPEX ET AL SUNDRE 2-22-34-5 (W5M)	18 Mar 1978 (3)	2 685.0	Blowout Servicing	21 x 10^3 m^3 sweet gas, wellhead damage	Equipment failure - tubing injector unit (hot oil) failed
ATKINSON MCLEOD 7-34-54-14 (W5M)	22 Mar 1978 (1)	1 476.0	Blowout Other (flow gas)	200 x 10^3 m^3 sweet gas	Equipment failure (casing)
COX SOUTHEASTERN FERRIER 10-36-38-7 (W5M)	13 Apr 1978 (4 h)	2 089.0	Blowout Other (susp oil)	6 m^3 oil, 1 m^3 sweet gas, casing valve, nipple	Third-party damage

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
GULF MEEKWAP 1-2-67-15 (W5M)	19 Apr 1978 (1)	2 328.0	Blowout Other (pump oil)	32 m³ oil, minor sour gas (6% H_2S)	Equipment failure
REDCO PORCUPINE L BOW 10-32-14-18 (W4M)	5 Jul 1978 (1.5)	1 119.0	Blow Drilling (tripping)	170 x 10³ m³ sweet gas	Insufficient mud density
MESA LL&E ATLEE 4-13-21-6 (W4M)	8 Jul 1978 (0.5)	934.0	Blow Drilling (tripping)	420 x 10³ m³ sweet gas	Swabbing
HUSKY GNOL CHAUVINS 6-30-42-1 (W4M)	14 Aug 1978 (0.5)	547.0	Blow Drilling (tripping)	No estimate of sweet hydrocarbon loss	Insufficient mud density
CALSTAN MEEKWAP 2-3-65-19 (W5M)	30 Aug 1978 (4 h)	2 952.0	Blow Servicing	95 m³ water, 16 m³ oil	Insufficient kill fluid density
HB STURGEON LAKE S 1-25-68-22 (W5M)	12 Oct 1978 (2)	2 563.0	Blow Other (pump oil)	1 m³ oil, minor sour gas (9% H_2S)	Equipment failure
CDN-SUP ONOWAY 7-11-55-2 (W5M)	20 Oct 1978 (6)	580.0	Blow Other (capped gas)	160 x 10³ m³ sweet gas	Failure to cover shallow gas zone with cement when cementing production casing

4.4 Historical Summary

BLOW AND BLOWOUT OCCURRENCES - 1987 to 1978

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
DOME EUREKA 7-36-82-11 (W6M)	1 Nov 1978 (1)	1 861.0	Blowout Other (shut-in gas)	340 x 10^3 m^3 sweet gas	Equipment failure
DOME EUREKA 7-36-82-11 (W6M)	11 Nov 1978 (1)	1 861.0	Blowout Servicing	280 x 10^3 m^3 sweet gas, wellhead flowline	Equipment failure
MICH WIS BISTCHO 11-35-112-2 (W6M)	14 Nov 1978 (1)	1 504.0	Blow Other (susp gas)	No estimate of sweet hydrocarbon loss	Equipment failure
WINCAN TEXFEL PEMBINA 8-29-50-9 (W5M)	20 Nov 1978 (6 h)	1 497.0	Blowout Other (standing)	No estimate of sweet hydrocarbon loss	Incorrect procedure
CANHUNTER ET AL KARR 10-4-65-2 (W6M)	7 Dec 1978 (1.5)	2 283.0	Blowout Other (standing)	No estimate of sweet hydrocarbon loss, damage to wellhead	Third-party damage

APPENDIX - DEFINITIONS

The definitions of terms used in the Drilling Rig Inspections section in this report are:

Active Rig	A rig that drilled at least one well in 1987.
Blow	A flow of fluids (gas, oil, water, mud, etc) to the atmosphere from a well, which can be or is brought under control in a very short time-frame by closing appropriate equipment (control regained almost immediately).
Blowout	A complete loss of control of a flow of fluids from a well. Control can only be regained by the installing of equipment to shut in or kill the well, or by drilling a relief well.
Critical Sour Well	a) any well from which the maximum potential hydrogen sulphide (H_2S) release rate is 0.01 cubic metres per second (m^3/s) or greater and less than 0.1 m^3/s and which is located within 500 metres (m) of the corporate boundaries of an urban centre, or b) any well from which the maximum potential H_2S release rate is 0.1 m^3/s or greater and less than 0.3 m^3/s and which is located within 1.5 kilometres (km) of the corporate boundaries of an urban centre, or c) any well from which the maximum potential H_2S release rate is 0.3 m^3/s or greater and less than 2.0 m^3/s and which is located within 5 km of the corporate boundaries of an urban centre, or d) any well from which the maximum potential H_2S release rate is 2.0 m^3/s or greater, or e) any other well which the Board classifies as a critical sour well having regard to the maximum potential H_2S release rate, the population density, the environment, the sensitivity of the area where the well would be located, and the expected complexities during the drilling phase.

Kick	Any entry of water, gas, oil, or other formation fluid into the wellbore.
Lost Circulation	The loss of drilling fluids from the wellbore into permeable formations penetrated by the well.
Serious Deficiency	A serious deficiency is any violation of regulations which occurs when a formation is open to the wellbore and which occurs prior to, during, or after the installation of appropriate BOP equipment and which could - restrict the crew's ability to safely detect and circulate out a kick or shut in the well, - contribute to an operational failure of any BOP equipment, - impair the crew's ability to maintain control of the well.
Significant Deficiency	Deficiencies rated as significant are those which should not affect the operation of the BOP system or restrict the crew's ability to control the well.
Sour Gas	Natural gas, including solution gas containing H_2S.
Sour Well	Any oil or gas well expected to encounter sour gas-bearing formations during drilling or any oil or gas well capable of producing sour gas.
Spud	Means commenced drilling.
Water Flow	An influx of water into the wellbore from a formation penetrated while drilling that may present problems in maintaining hole integrity.

Operations at time of blow or blowout

- Drilling	Original operation to drill a well or subsequent deepening of a well.
- Servicing	Servicing operations at a well involving completion, stimulation, special testing, recompletion, or changing downhole equipment (often called workovers).
- Other	Routine production/injection and maintenance operations, third-party damage, suspended, or standing well.